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Plant Pest Control Division
Agricultural Research Service
United States Department of Agriculture

C O N T E N T S

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COOPERATIVE PLANT PEST CONTROL PROGRAMS FISCAL YEAR 1966

INTRODUCTION

The containment of several program pests has become increasingly more difficult and spread to uninfested areas has occurred because of the residue problem associated with the use of certain chlorinated hydrocarbon pesticides. Research studies and methods improvement investigations are being expanded in an effort to resolve the pesticide problem. These include the screening of new chemicals, release of biological agents, and the use of attractants and sterility techniques for control purposes. Mass rearing of insects which is basic to the use of sterility control techniques has been accorded a high priority. The encapsulation of pesticides and attractants for the purpose of improving their efficiency is being explored.

New aircraft guidance systems tested on the imported fire ant program have proved effective and less costly and have improved precision of aerial application. In the past aircraft guidance required as many as 10 helium filled kite-type balloons for marking the flight line for each aircraft along with at least 10 men, vehicles, and radios.

A radio guidance system field tested in Louisiana operates by means of signals broadcast from three ground stations. A computer installed in each aircraft receives the signals and automatically charts the position of the aircraft on predetermined flight lines. Precise application is possible by this method and several planes can use the system simultaneously. In Louisiana, only two Federal supervisors were required to check the guidance system on more than 800,000 acres.

Where electronic guidance is not available, another system involves the use of powerful lights mounted on the aircraft applying insecticides. By using these lights, aircraft guide on each other as they approach from opposite ends of the block being treated. Flight lines 10 miles long are possible. Only two men on each end of the block are required to move the markers.

In the continuing effort to inform the public concerning the objectives of quarantine action and to request participation, a special detailed report was prepared and released covering the function and purpose of domestic plant quarantines. A leaflet was prepared for more general distribution. All certificates and permits were modified to provide for the use of Federal certificates in areas included only under regulation by parallel State quarantines. Other desirable changes were also made in these documents. At the request of the Plant Boards, a model pest control law was prepared and reviewed with all of the State regulatory officials and the Plant Boards. It was then redrafted and submitted to the States for their guidance in connection with desirable changes in their laws. Some amendments have been made in State laws utilizing this guideline. The white pine blister rust quarantine was reviewed and discussed at each of the plant board meetings to determine whether the Federal quarantine should be revoked or updated.

Progress was made during the year in development of better methods for detection of program pests. Synthesis of pink bollworm sex lure by Entomology Research Division marked a major breakthrough. Although preliminary results from field use of the material have been erratic, possibilities of further refinement look promising. The presence of an attractant in the female khapra beetle was discovered in research carried out under provisions of Public Law 480 in Israel. These investigations are being continued. Several trapping devices for cereal leaf beetle adults were developed and tested in order to supplement the present sweep-net technique. Hibernation cages, sticky-board traps, and attachments for grain combines showed promise. Preliminary considerations were undertaken on the use of remote sensing techniques as a possible tool for imported fire ant survey. Large-scale testing was carried out and will be continued on the relative merits of an economical plastic trap and the standard metal trap for Japanese beetle detection. In order to learn more about important insects not

known to occur in the United States, research projects were planned and submitted to the Director of the PL 480 program for consideration in certain foreign countries where funds are available. Detection of foreign pests around ports of entry was strengthened principally in the eastern and southern regions. Plant Quarantine Division and some State agencies are cooperating in this work.

Items of interest on specific programs are included in the following pages. Tables of accomplishment are also included in an appendix (see p.17).

COOPERATIVE FEDERAL AND STATE PROGRAMS

BARBERRY ERADICATION

The objective of the barberry eradication program is the control of stem rust, the most destructive disease of cereal crops. More than 557 million barberry bushes have been destroyed on some 158,000 properties on this program. The cooperative Federal-State stem rust control program, of which barberry eradication is a part, has practically eliminated destructive areawide epidemics of this disease. During the 1966 fiscal year, 3,767,820 rust-susceptible barberry bushes were destroyed on 1,886 properties in 16 States. Barberry eradication remains basic to the total stem rust control effort. With new races of the rust organisms developing on the barberry, there can be no assurance of permanent protection by grain varieties that currently are resistant.

The annual inspection of nurseries was made to determine that only rust-resistant plants are grown for interstate shipment. A total of 747 firms qualified and were authorized to ship approved species and varieties of barberry mahonia and mahoberberis.

Stem rust of wheat caused by the fungus on rust-susceptible barberry.

BOLL WEEVIL

Migrations of the boll weevil from the Presidio Valley in southwest Texas north along the Rio Grande threaten the cotton-producing areas of west Texas, Arizona,

and New Mexico. The weevil found in the Presidio, Texas-Ojinaga, Mexico border area is thought to have become adapted to the hot, dry climate and differs from the boll weevil that infests the southern cotton-producing States.

Current observations indicate that malathion at the rate of 16 ounces to the acre has been effective in reducing boll weevil populations to a very low level.

Since 1961 insecticide has been applied to eradicate the weevil in a buffer zone extending from Ruidoso to El Paso. This program has kept the pest from reentering the El Paso-Juarez area and has pushed the infestation back down the Rio Grande some 175 miles. In 1965, eradication treatments were applied to the entire cotton acreage in the Presidio area of Texas and adjacent areas of Mexico. This was the first year of a 3-year program to determine if the boll weevil could be eradicated by the destruction of the population before it goes into hibernation. Surveys following this treatment indicate a high degree of success was attained the first year.

The boll weevil program in the Texas High Plains area is entering its third year of operation. During 1965, 350,000 acres received multiple treatments of technical malathion at 16 ounces to the acre. This is a planned 3-year program. Surveys following the 1965 control season indicate a 98 percent reduction of the overwintering population.

Low-volume spraying is safe, fast, and more economical.

BURROWING NEMATODE

The burrowing nematode is an introduced parasitic eelworm that has a wide host range. In this country it causes a disease called spreading decline, which has been found only in Florida. The infestation is being contained by a chemical barrier program and eradication treatment of severely infested nonproductive groves. New citrus nurseries can be established only on sites that are known to be free of the nematode.

Last year an infestation of this serious citrus pest was discovered in the largest commercial citrus nursery in Florida. Immediate steps were taken to survey all citrus-producing nurseries in the State and a few additional infestations have been discovered. Florida has strengthened its sanitation and regulatory activities to prevent spread from citrus nurseries.

Surveys are being made in groves planted with nursery stock which originated in the recently discovered infested nurseries. Infested trees are destroyed and the soil fumigated. Additional work is required to fully determine the extent to which infestations have been spread as a result of the movement of stock from infested nurseries.

GRASSHOPPER

Severe grasshopper populations built up in the spring of 1966 in Idaho, Montana, New Mexico, Oregon, Texas, Utah, and Wyoming. Total acreage requiring treatment during the 1966 crop season may reach 2 million. The 1966 outbreak is the most severe since 1958. The control program involves the use of LV malathion applied by aircraft at the rate of 8 ounces per acre.

GYPSY MOTH

Approximately 9,650,000 gypsy moth parasites and predators were reared and released during 1965-66. The various species were released in saturation numbers primarily along the periphery of the generally infested area in New Jersey, New York, and Pennsylvania. Included in this biological control effort were releases of the egg parasite, *Ooencyrtus kuwanni*; the larval parasites, *Sturmia scutellata* and *Apanteles* sp.; a pupal parasite, *Brachymeria intermedia*; and the effective predaceous beetle, *Calosoma sycophanta*. Assessment of this dual purpose colonization-suppression parasite introduction into recently infested sites is in progress.

Cooperative investigations under provisions of Public Law 480 are being continued to determine whether other species of predators and parasites not yet established in this country might be of potential value. New strains of previously introduced species and species not known to occur in this country will be studied for their adaptability for establishment in the more southerly areas of infestation. Tests utilizing saturation releases of parasites to achieve population suppression by overflooding with single species or a complex of parasites are being considered.

IMPORTED FIRE ANT

Increased control and eradication efforts coupled with the enforcement of quarantine regulations have served to contain the imported fire ant within the general area of previous infestations--approximately 41 million acres in rural and urban localities in nine Southern States which represent an estimated 5 percent of its ecological range. Extensive surveys conducted from late fall to early spring, when plant cover is sparse, revealed new infestations which were intermingled with or were adjacent to established infestations.

This year, treatments for this pest were completed on more than 5 million acres. This acreage, treated primarily by air, represents a new high for a single year and is indicative of the renewed interest and effort directed at eradication by cooperating agencies and the general public. Treatment operations were, for the most part, carried out on the periphery of the generally infested area and in isolated spots removed from other infestations. More than 13 million acres have been treated since the beginning of the program. Mirex continued to be the insecticide of choice.

Methods improvement studies were continued in an effort to develop better control procedures. Tests this year have shown that mirex bait is capable of achieving eradication if applied in split applications, at 4- to 6-month intervals, using 1 1/4 pounds of 0.3 percent bait per acre for each application. As many as three applications may be necessary, depending upon the reproductive capabilities of the ant at various localities in its range.

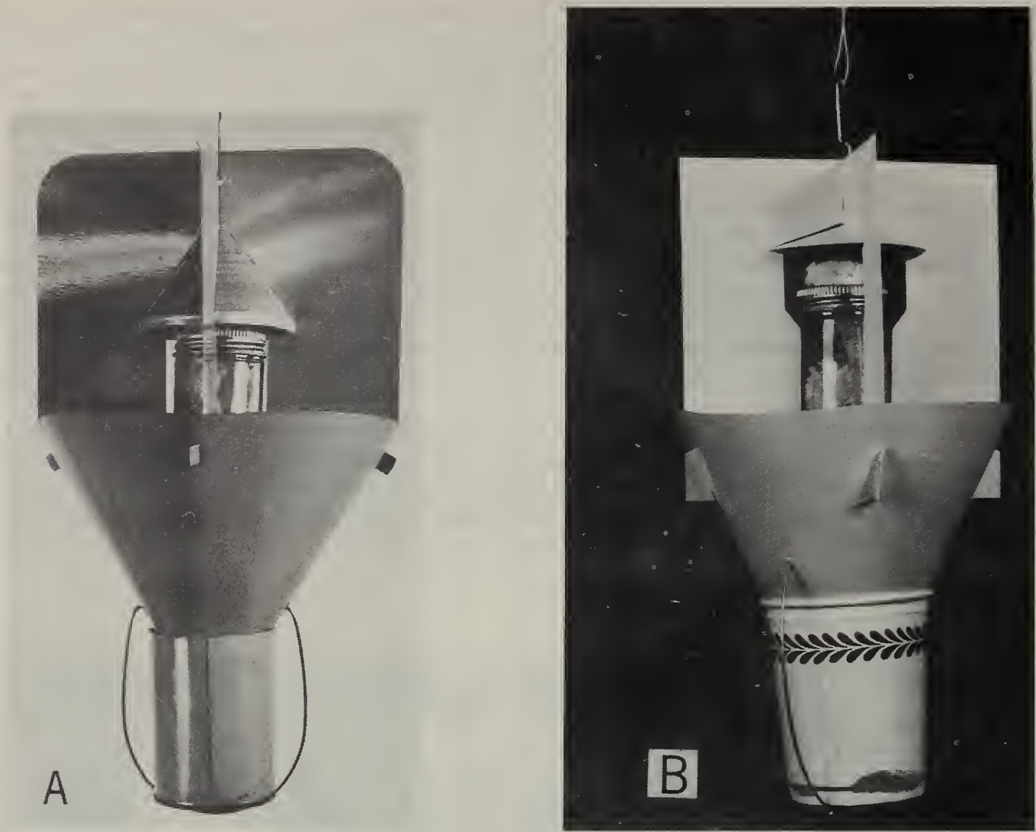
In an effort to prolong the effectiveness of mirex bait after application, possible substitutes for corncob grits have been investigated. Preliminary laboratory tests have shown furfural grits, a manufacturing by-product of corn, to be very promising. Further tests are planned to evaluate the effectiveness of this product under field conditions. Encapsulated baits, likewise, are being studied in an effort to increase residual action and possibly eliminate the need for multiple applications.

The effective tools, including an electronic aircraft guidance system, which are now available, have encouraged the Division to look forward to eventual eradication. A plan designed to drive back the imported fire ant in 3 years to the approximate infested area of 1957 has been endorsed and has been proposed by the Southern Plant Board.

Field headquarters for electronics guidance system.

JAPANESE BEETLE

During the last half century the Japanese beetle has been a pest in the Eastern United States. Spread has reached from southern Maine to northern South Carolina, eastern Georgia, eastern Tennessee, northeastern Kentucky, Indiana, and parts of Illinois and Michigan. A limited, light infestation persists at St. Louis, Mo. An established infestation was found on June 7, 1961, in Sacramento, Calif. Eradicative measures were undertaken, and the last adult was found 1 year later. The California infestation was declared eradicated in the fall of 1965. Over 43,000 traps, baited with anethole-eugenol, are used annually for detection of the pest outside of federally regulated areas. In addition, visual scouting is conducted. Control or eradicative treatments, either by ground or air, were applied to 28,467 acres in 11 States during fiscal year 1966.



Japanese beetle traps: A, Metal type; B, Experimental plastic type.

CEREAL LEAF BEETLE

The cereal leaf beetle was first found in southwestern Michigan in July 1962. As of June 30, 1966, the pest had been recorded in 171 counties in four States: 3 in Illinois, 54 in Indiana, 50 in Michigan, and 64 in Ohio.

During the past 3 years, control treatments consisting of undiluted technical malathion aerial sprays have contained the pest to the 4-State area. All known infestations have been treated in Illinois precluding the need for quarantine action. The other three States have adopted uniform quarantine regulations to prevent spread. The gradual expansion of the infestation within Indiana, Michigan, and Ohio, due to natural spread factors, coupled with the increasing need for blanket insecticide applications, made it necessary to explore supplemental control techniques.

Based on parasite investigations initiated by Purdue University and Michigan State University in 1963, a cereal leaf beetle parasite-rearing facility was established by the Division in Michigan during the spring of 1966. Studies are underway to develop rearing techniques and colonization procedures for several promising egg and larval parasites. Colonization of introduced parasites will be attempted initially followed by saturation releases of the most effective species. Initial large-scale liberations are expected during the spring of 1967. Parasite introductions on lightly infested peripheral areas and outlying sparse populations may preclude the need for chemical control action.

CITRUS BLACKFLY

A citrus blackfly infestation was found at Matamoros, Mexico, May 24, 1966. This infestation involved two properties and seven orange trees located five or six blocks from the international border. An additional very light infestation was found on one lemon tree June 23, approximately 24 blocks southeast of the first infestation. Following the first find, survey activity was intensified. Treatments have been applied against all infestations. The last previously known citrus blackfly infestation along the border in the Matamoros area was eradicated in 1956.

Detection surveys for citrus blackfly conducted in the Texas citrus area during the year were negative. The citrus blackfly control program in Mexico has been conducted on a cooperative basis since 1948. As part of this program, a citrus blackfly "free zone" has been created about 100 miles wide south of the international border.

GOLDEN NEMATODE

An infestation of the golden nematode discovered on Vancouver Island, British Columbia, in 1965 created a new threat to the United States potato industry. Steps were taken by Canada immediately to prevent spread into the United States and to other parts of Canada. Technical assistance was provided to the Canadians for initiating an aggressive survey and eradication program. The infestation is restricted to 9 properties, all within 4 miles of the original find. All known infestations and exposed land have been treated.

The Canadians have obtained information concerning the shipment of nursery stock and potatoes from infested areas. All leads have been checked to determine whether the infestation has spread to other areas. No infestations have been found as a result of these shipments.

Additional progress was made in the progressive eradication program on Long Island, N.Y., the only known infested area in the United States. All known infested potato fields on Long Island had been treated by 1965. Surveys since have shown additional potato acreage infested which will receive a treatment during the summer of 1966. The development of a resistant potato variety together with the chemical treatment program should increase the possibility of eliminating this pest from the United States.

Applying soil fumigant on the golden nematode program.

KHAPRA BEETLE

The khapra beetle, one of the most damaging pests of stored products, is a continuing threat to the grain, seed, and feed stored in this country. Continued detection surveys revealed a new infestation in a feedlot and storage building near Brawley, Calif., in March 1966. In California this infestation was the first since it was eradicated from the State in early 1962. Khapra beetle was last found in the United States in February 1965 and in Mexico in March 1965. In this latest outbreak about 2 2/3 million cubic feet of storage facilities at the feedlot in Brawley were fumigated. Infestations have been found and eradicated at more than 800 sites in Arizona, California, New Mexico, Texas, and the Republic of Mexico, since the pest was first found in California in 1953. At the close of the year no nontreated infestations were known to occur in the United States or Mexico.

Cattle feeding establishments often present difficult problems when infested with khapra beetle. Main structure and supplemental structures being fumigated. For the most part, the fences are sprayed with malathion and oil.

MEDITERRANEAN FRUIT FLY

The continuing extensive detection program conducted for Mediterranean fruit fly led to the discovery of this destructive foreign pest in Brownsville, Tex., June 13, 1966. Although the insect has been eradicated successfully from Florida on four different occasions in the past, this is the first record of the pest in Texas.

Texas initiated emergency quarantine measures immediately to prevent spread from the infested area through movement of host fruits and vegetables. A Federal regulation is being processed as rapidly as possible to regulate interstate and international movement of host fruits and other carriers. Mexican officials also invoked regulations to prevent possible spread southward into that country.

Following the discovery, immediate steps were taken by State and Federal agencies to intensify and expand survey activities on both sides of the Rio Grande. Additional traps and lure were brought in from Florida and other areas in this country and Mexico where trapping is also carried out on a continuing basis to guard against invasions of the pest from Central America. The Republic of Mexico is cooperating closely in the present outbreak in the Rio Grande Valley area.

Preliminary plans called for the installation of 2,000 traps on each side of the Rio Grande River. At least half of the traps had been placed by June 30. The survey program included the commercial citrus area of south Texas. Detection surveys in Mexico were concentrated in Matamoros outward and along the Rio Grande to parallel the trapping area on the Texas side of the river.

As of June 30, flies or larvae had been collected at 32 sites in Brownsville. The infestation was classed as very light. No flies had been found in adjacent areas of Mexico by this date.

This infestation involved a treatment area of approximately 13,000 acres. The treatment plans call for the use of 2.4 fluid ounces of technical malathion in 9.6 ounces of protein hydrolyzate sauce bait, an attractant--12 ounces of total formulation to the acre. Application will be made six times at weekly intervals by commercial multiengine aircraft. Application and insecticide cost approximately $0.43 an acre each application. The objective is eradication.

The Mediterranean fruit fly has increased both in intensity and in area in Central America. Because of modern highways and increased travel this is a distinct threat to citrus and other hosts in Mexico. If the fly becomes established in Mexico, it will be difficult to prevent its entry into the United States. As an added precaution, traps have been set in the most vulnerable areas of Mexico to detect any infestation which might become established in that country. The greatest number of traps are in operation in the southern part of the country. Detection surveys were also continued in Arizona, California, Florida, Louisiana, Mississippi, and in other vulnerable areas in Texas.

MEXICAN FRUIT FLY

The release of sterile Mexican fruit flies in northwestern Mexico continues to provide protection to the United States from this serious pest. A facility to rear the necessary flies has been installed at Monterrey, Mexico, to provide a supply of flies for sterilization and release. A gamma cell irradiation procedure is being utilized. Over 2 1/4 million flies were released from May through November 1965. The number of wild flies trapped during this period was reduced almost by one-half of those trapped for a similar period when pesticides were used.

The Mexican officials are interested in the possibility of releasing irradiated flies in generally infested areas as a means of reducing economic damage to crops produced in that country. Should this procedure be adopted by Mexico, it will further reduce the likelihood of artificial introduction of this important pest into agricultural areas in the United States.

MORMON CRICKET

Surveys in the Western States in areas with a history of Mormon cricket infestations indicated that the populations continue to be low with very limited, spotty infestations of economic importance. Controls were applied on 10,300 acres in Washington County, Idaho. Good results were obtained with malathion sprays.

PINK BOLLWORM

For many years the pink bollworm has been present in Arizona, Arkansas, Louisiana, New Mexico, Oklahoma, and Texas, and on wild cotton in the Florida Keys. Artificial spread has been held in check through the enforcement of quarantine regulations. Cultural control measures used by farmers have reduced economic losses due to this pest and have assisted in retarding natural spread where effectively applied.

In 1965, the pink bollworm built up to economic levels in a number of areas in Arizona. This buildup now threatens the adjacent cotton-producing areas in the Republic of Mexico and California. In the fall of 1965, infestations of the pink bollworm were found in two counties in southern California and in the Republic of Mexico just south of the Arizona-California border.

A regulatory-control program has been initiated to suppress outlying infestations to prevent further spread of the pest in California and Mexico. Surveys have been intensified in these areas utilizing a combination of synthetic and natural attractants which aids in early detection of incipient infestations.

New, effective, and low-cost pink bollworm trap.

SOYBEAN CYST NEMATODE

Excellent progress was made toward the development of a soybean variety that is resistant to the soybean cyst nematode. A new yellow-seeded variety similar to the Lee variety has been developed and named Pickett. Pickett is not resistant to the strain of the soybean cyst nematode occurring in Holland, Va.; however, it is expected to be resistant to strains of the soybean cyst nematode found in most of the infested areas known today in the United States.

It is expected that seed of the Pickett variety will be available in limited supply for farm planting in the spring of 1967. This is an encouraging development because the soybean cyst nematode is being found in increasingly large areas of the Mississippi River Valley. During the fiscal year, 23 new counties were found infested in 5 Mississippi Valley States.

SURVEY AND DETECTION OPERATIONS

There were eight insects reported in the United States for the first time in 1965. A total of 105 new State records, involving 98 known species, was reported from 34 States during the year. Included in the new U.S. records were two for North America and one for the Western Hemisphere.

One of the insects, the Formosan subterranean termite (Coptotermes formosanus Shiraki), was found in Houston, Harris County, Tex. This is a very important introduction as this species seriously damages wood and wood products wherever found in southwest Asia. This represents a new North American record. Additional infestations were found in Houston and Galveston, Tex., and in New Orleans and Lake Charles, La., in June 1966 through a large-scale cooperative detection effort. Arrangements were made with State regulatory officials to prevent artificial spread to noninfested areas.

Damage by the Formosan subterranean termite can be extensive.

Another important species reported in the United States for the first time was the tobacco and tomato caterpillar (Spodoptera litura (F.)). This pest was collected in Hawaii, on Pearl and Hermes Reef in the leeward Hawaiian Islands. The location was approximately 1,500 miles from Honolulu. This insect would be a serious problem if it became established on the mainland.

Detection surveys for the Mediterranean fruit fly and other important foreign fruit flies continued in Arizona, Florida, Louisiana, Mississippi, and Texas, utilizing approximately 27,871 traps. The survey led to the discovery of Medfly at Brownsville, Tex., June 13, 1966, the first record for Texas. No flies have been found in Florida since May 20, 1964. Surveys using 4,370 traps in 17 States in the Republic of Mexico also were negative.

Specialized trapping for the oriental fruit fly, inaugurated after one specimen was found at St. Petersburg, Fla., in October of 1964, was discontinued after no more specimens were caught. A trapping program was initiated for this fruit fly in Los Angeles County, Calif., after a single specimen was found at Harbor City, June 21, 1966.

Caribbean fruit fly (Anastrepha suspensa (Loew)), normally found in the Islands of Cuba, Hispaniola, Jamaica, and Puerto Rico and first found in the United States in Key West, Fla., in 1930, was trapped in large numbers on April 27, 1965, near the International Airport in Miami. Extensive surveys have revealed its presence in 10 counties in southern Florida. No economic damage has been reported to commercially important crops.

The occurrence of pear sawfly (Hoplocampa brevis), an economic pest of pears in Europe, was confirmed in New York in early 1966. The sawfly was not known to occur in the United States previously. Confirmation was made through review of specimens collected in Orange County, N. Y., in 1953. The pest was found in Canada in 1964, thus encouraging additional survey effort in the northeastern area. The stepped-up surveys revealed infestations in Connecticut, Pennsylvania, Rhode Island, and additional areas of New York.

Cooperative agreements providing for survey entomologists on a share-cost basis were in force in 25 States at the close of the year. Hawaii is the most recent addition. Four modified agreements are included in the total of 29 agreements.

More than 1,200 cooperators furnished some 1,500 weekly insect condition notes for publication in the weekly Cooperative Economic Insect Report. This information was released earlier at the State level for benefit of local pest control interests.

SWEETPOTATO WEEVIL

In the generally infested areas of Alabama, Florida, Louisiana, Mississippi, and Texas, the sweetpotato weevil situation remains unchanged. Commercial potato production is extremely low, and infestations now occur almost everywhere host plants, wild or cultivated, are found.

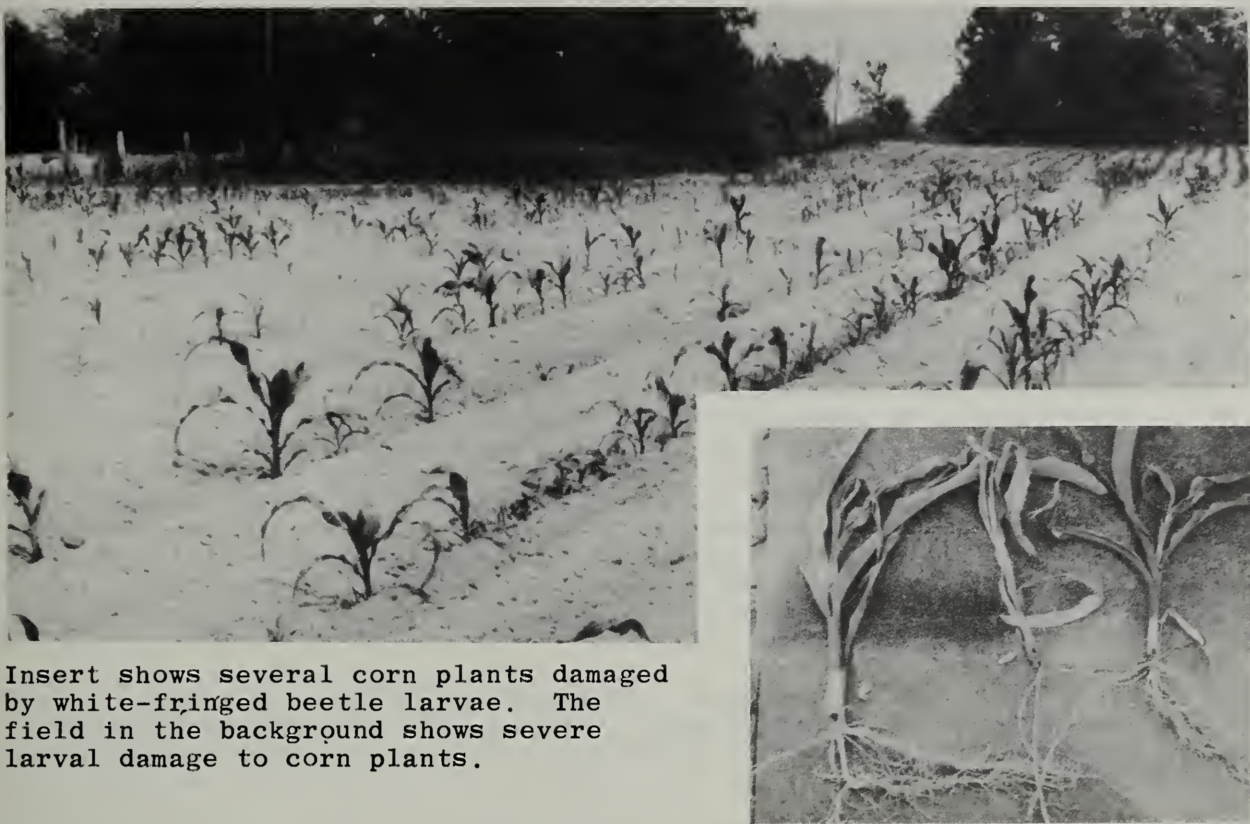
In the eradication zones, populations are light though still persisting in most of the eradication counties. In Alabama, five previously infested counties were released after three years of negative survey. In other parts of the eradication area, the picture is good. In Florida, the situation remains unchanged. Very little work is being done; and the State, for the most part, is generally infested. Commercial production except for local consumption is nil. In Georgia, good progress is being made in all eradication counties, very few of which are now under general quarantine. Many parts of all these counties have been released from regulations because of effective eradication programs. In Louisiana, infestations were found for the first time in four parishes, though properties released in other parishes kept the infestations in balance. It is not believed that these finds have appreciably aggravated the situation in that State. In Mississippi, this year, a few infestations were found in Adams and Jones Counties, but no weevils were found on previously infested properties in Amite, Lincoln, and Simpson Counties. In South Carolina, infestations continue in the marshy, morning-glory sections of Jasper, Beaufort, and Charleston Counties. In this area, very light infestations occur. The program of wild host plant destruction has kept the population low and prevented the infestation from spreading beyond this area into the commercial sections of these and other counties of the State.

WHITE-FRINGED BEETLE

During fiscal year 1966, white-fringed beetles were found for the first time in Maryland in Prince Georges County and in 15 new counties in States previously regulated. In all 119,076 acres were added to the infested area. By the end of fiscal year 1966, a cumulative total of 2,025,632 acres has been infested with the pest. It should be noted, however, that this included the total acreage found since the beginning of the program, not the total acreage presently supporting white-fringed beetle populations.

The problems associated with the use of persistent pesticides are making control and retardation of spread of white-fringed beetle extremely difficult. This Division is cooperating with Entomology Research Division in testing various insecticides against white-fringed beetle and is collecting and examining larvae for any virus, protozoan, or bacterial disease. It is hoped that these investigations will lead to new and acceptable control procedures.

An important development became evident during the year: *Graphognathus peregrinus* was being found throughout the Southeast in increasing numbers, both in new areas and in areas already supporting other races of white-fringed beetle. In one localized area this species has shown resistance to the common insecticides used as soil treatments for certification. Should this resistant strain show up in other areas, regulatory and control problems would be compounded.



Insert shows several corn plants damaged by white-fringed beetle larvae. The field in the background shows severe larval damage to corn plants.

WITCHWEED 1/

Witchweed, discovered for the first time in the United States in 1956, continues to be confined to a relatively small contiguous area in 24 North Carolina counties and 11 South Carolina counties. The addition of Georgetown County in South Carolina was the first new county found infested since 1963. At the close of the 1966 survey season, 297,190 acres were known to be infested in the two States, or an increase of 17,118 acres. This was less than the 1964 increase. Extensive surveys were conducted in the two known infested States and limited surveys were conducted in 20 other States where corn, sorghum, and sugarcane are grown. All surveys outside of the known infested area were negative.

Treatments have been applied on 11,187 farms since the beginning of the program. The principal control chemical was a herbicide, 2,4-D applied at the rate of 1/2 to 1 pound per acre. In cotton where 2,4-D cannot be used, preplanting treatments of trifluralin at rates of 1/2 to 1 pound per acre reduced the stand of weedy grass host plants. Several other new materials show promise. Helicopter application of a 2,4-D invert emulsion did not give control of witchweed at volumes of liquid which would be practical for field use.

1/ The scientific name for witchweed changed from *Striga asiatica* to *Striga lutea* Lour.

Research and methods improvement scientists are continuing their search for better control and regulatory treatments. Tests include postemergence herbicides as substitutes for 2,4-D, preplanting, and preemergence herbicides that can be used on corn, cotton, tobacco, peanuts, and soybeans, systemics for use in corn and soil fumigation to destroy seed. Work is continuing on studies to isolate and identify the stimulant in host crops that triggers witchweed seed germination.

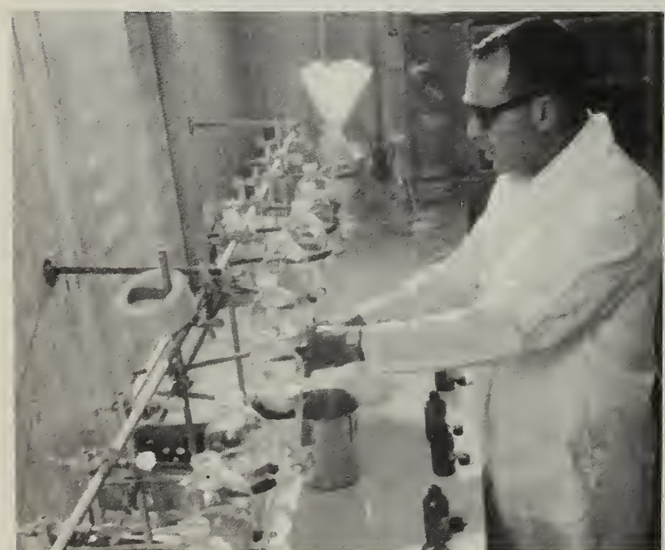
PESTICIDE SAFETY AND MONITORING

Programs to monitor the effects of pesticides on the environment, which were initiated in 1963, were expanded in 1965. More than 6,000 samples of soil, sediment, water, crops, fish, wildlife, and other environmental media were analyzed for pesticide residues at a central laboratory in Gulfport, Miss., during fiscal year 1966. Special studies were arranged with State and Federal agencies and universities under contract to assess the effect of large-scale cooperative control programs on nontarget organisms and public health.

A report on preliminary results of the 1964 studies in the Mississippi Delta will be distributed to cooperators interested in pesticide use problems. These results indicate that there has been no progressive buildup of any great magnitude of any organic pesticide in soil, sediment, or water in areas monitored. For example, a cumulative total of about 30 pounds of DDT per acre was applied to cotton fields over a 9-year period in one area. The residues found in the soil in the spring of 1964 (1.3 p.p.m.) are equal to about one-third to one-half of the amount applied per acre in any given year. The disappearance rate of endrin from treated fields is particularly noteworthy. Residue levels in soil samples in these areas averaged 0.05, 0.08, and 0.33 p.p.m. Generally, analysis of water for insecticides under study showed very small amounts of residues present except during periods of heavy runoff.

Monitoring of gypsy moth control programs, where carbaryl (Sevin) was used in New Jersey, Massachusetts, and Pennsylvania, revealed that the insecticide as used, was not a hazard to human health, wildlife, and fish. It does cause bee mortality, however.

Similar monitoring studies involving low volume application of malathion were conducted in Michigan, Nebraska, Texas, and Wyoming. Reports from each of the monitoring efforts indicate that LV malathion is relatively safe and has no harmful effects on human, fish, wildlife, and food and feed crops as used on the programs studied. Bee colonies and bee foraging areas should be avoided, however, unless precautionary measures are taken.



A processing step for extraction of pesticides in the National Soils Monitoring Laboratory.

APPENDIX

Table 1. Barberry eradication program, fiscal year 1966

State	Survey	Control			Regulatory
	Area surveyed	Plants destroyed	Area placed on maintenance	Area to be worked	Nurseries inspected
	Square miles	Number	Square miles	Square miles	Number
Alabama	--	--	--	--	27
Arkansas	--	--	--	--	5
Florida	--	--	--	--	3
Georgia	--	--	--	--	21
Louisiana	--	--	--	--	18
Mississippi	--	--	--	--	5
North Carolina	--	--	--	--	6
Oklahoma	--	--	--	--	19
South Carolina	--	--	--	--	4
Tennessee	--	--	--	--	42
Texas	--	--	--	--	12
California	--	--	--	--	43
Colorado	94	57,259	3	176	7
Montana	5	83	5	22	5
Oregon	--	--	--	--	44
Utah	--	--	--	--	5
Washington	60	1,717	189	706	4
Wyoming	1	--	6	13	--
Connecticut	--	--	--	--	23
Delaware	--	--	--	--	13
Maryland	--	--	--	--	35
Massachusetts	--	--	--	--	17
New Jersey	--	--	--	--	58
New York	--	--	--	--	53
Pennsylvania	1,215	13,644	578	10,039	51
Rhode Island	--	--	--	--	9
Virginia	60	1,699,820	5	521	55
West Virginia	82	1,979,141	21	472	21
Illinois	132	62	37	554	32
Indiana	20	4	8	466	14
Iowa	756	398	408	3,345	8
Kansas	1,058	251	1,028	6,739	20
Kentucky	--	--	--	--	11
Michigan	268	3,105	27	995	24
Minnesota	96	811	7	1,117	30
Missouri	61	14	39	121	12
Nebraska	44	75	8	234	3
North Dakota	--	--	--	12	1
Ohio	150	855	399	1,172	51
South Dakota	5	--	3	23	1
Wisconsin	122	11,815	56	2,680	6
Total	4,229	3,769,054 3,770,054	2,827	29,407	818

Table 2. Boll weevil, fiscal year 1966

State, U.S. and Mexico	Survey and Detection		Control
	Area surveyed	Area infested	Area treated
	Acres	Acres	Acres
Alabama	--	--	--
Arizona	36,852	--	--
California	141,425	30	--
Mississippi	--	--	--
New Mexico	6,602	--	--
Texas	171,634	15,557	1,550,321
Baja California	5,931	--	--
Sonora	32,143	5,892	14,567
Chihuahua	33,487	1,623	78,064
Total	428,074	23,102	1,642,952

Table 3. Burrowing nematode in Florida, fiscal year 1966

Survey and Detection		Control				Regulatory	
Properties	Groves delimited	Groves pushed and treated	Area pushed and treated	Groves buffer treated	Area treated	Sites approved	Stock treated
Number	Acres	Number	Acres	Number	Feet	Number	Number
3,263	5,346	219	782	32	141,797	174	8,423

Table 4. Cereal leaf beetle, fiscal year 1966

State	Survey and Detection		Control	Regulatory
	Properties surveyed	Area infested	Area treated	Commodity treatments
	Number	Acres	Acres	Number
Arizona	34	--	--	--
Arkansas	431	--	--	--
Colorado	115	--	--	--
Connecticut	59	--	--	--
Delaware	102	--	--	--
Florida	26	--	--	--
Illinois	2,445	3,840	112,304	~~13~~
Indiana	1,381	21,440	653,596	-- 13
Iowa	205	--	--	--
Kentucky	998	--	--	--
Maine	23	--	--	--
Maryland	563	--	--	1
Massachusetts	24	--	--	--
Michigan	8,524	3,704,824	861,147	1,375
Missouri	262	--	--	--
New Hampshire	23	--	--	--
New Jersey	224	--	--	--
New Mexico	1	--	--	--
New York	10	--	--	--
North Carolina	79	--	--	--
Ohio	3,333	92,000	--	260
Oklahoma	225	--	--	--
Pennsylvania	2,850	--	--	--
Rhode Island	16	--	--	--
Tennessee	53	--	--	--
Vermont	22	--	--	--
Virginia	1,157	--	--	--
West Virginia	2,594	--	--	--
Wisconsin	308			
Total	26,087	3,822,104	1,627,047	1,649

Table 5. Citrus blackfly, fiscal year 1966

U.S. and Mexico State	Survey and Detection: Properties surveyed	Survey and Detection: Properties infested	Control: Host plants treated	Control: Parasites 1/ released
	Number	Number	Number	Number
Arizona	273	--	--	--
Texas	3,680	--	--	--
Baja California	1,540	--	--	--
Nuevo Leon	15,177	52	28,892	--
Sonora	2,770	--	2,094	--
Tamaulipas	7,062	226	13,167	--
Total	30,502	278	44,153	2/2,364

1/ Unit of 1,000 flies.

2/ Data from narrative reports, unable to breakdown by States.

Table 6. European chafer, fiscal year 1966

State	Survey and Detection: Properties visually surveyed	Survey and Detection: Sites trapped	Survey and Detection: Area infested	Control: Area treated	Regulatory: Area treated	Regulatory: Commodity treatments
	Number	Number	Acres	Acres	Acres	Number
Arizona	4	--	--	--	--	--
Connecticut	13	49	1,237	--	5	3
Delaware	--	28	--	--	--	--
District of Columbia	--	2	--	--	--	--
Maine	--	33	--	--	--	--
Maryland	--	123	--	--	--	--
Massachusetts	210	247	--	--	--	--
New Hampshire	--	21	--	--	--	--
New Jersey	625	551	2,505	55	--	--
New York	58	3,055	15,080	90	229	9
Ohio	45	473	2,800	2,303	--	--
Pennsylvania	145	1,698	3,640	8,810	--	--
Rhode Island	--	11	--	--	--	--
Vermont	--	105	--	--	--	--
West Virginia	31	70	--	--	--	--
Total	1,131	6,466	25,262	11,258	234	12

Table 7. Golden nematode, fiscal year 1966

State	Survey and Detection				Control	Regulatory
	Properties surveyed	Area surveyed	Samples taken	Area infested	Area fumigated	Potato grader station inspections
	Number	Acres	Number	Acres	Acres	Number
California	278	11,746	1,261	--	--	--
Idaho	311	9,980	499	--	--	--
Maine	695	21,100	2,194	--	--	--
Massachusetts	156	3,523	359	--	--	--
Montana	128	5,657	299	--	--	--
New Jersey	107	4,330	849	--	--	--
New Mexico	57	1,443	171	--	--	--
New York	1,513	48,642	56,084	382	381	1,723
Oregon	10	7,065	707	--	--	--
Rhode Island	79	1,521	386	--	--	--
Washington	12	3,776	379	--	--	--
Total	3,346	118,783	63,188	382	381	1,723

Table 8. Grasshopper control, fiscal year 1966

State	Survey and Detection	Control
	Area infested 1/	Area treated
	Acres	Acres
Arizona	1,811,200	--
California	127,010	7,080
Hawaii	--	1,920
Idaho	1,567,280	546,340
Montana	9,080,000	388,389
Nevada	49,900	--
New Mexico	31,900	10,820
Oklahoma	342,500	--
Oregon	600,700	52,696
South Dakota	38,740	--
Texas	159,600	96,312
Utah	215,625	88,178
Washington	246,000	--
Wyoming	2,342,000	391,281
Total	16,612,455	1,583,016

1/ Adult survey - 1965.

Table 9. Gypsy moth, fiscal year 1966

State	Survey and Detection: Properties visually surveyed	Survey and Detection: Sites trapped	Survey and Detection: Area infested outside regulated area	Control: Area treated chemically	Regulatory: Commodity treatments
	Number	Number	Acres	Acres	Number
Arkansas	66	--	--	--	--
California	--	561	--	--	--
Connecticut	--	--	--	--	62
Delaware	134	29	--	--	2
District of Columbia	3	--	--	--	--
Illinois	1	--	--	--	--
Indiana	--	--	--	--	1
Iowa	--	50	--	--	--
Kentucky	--	--	--	--	3
Maine	--	2,243	--	--	9
Maryland	184	31	--	--	--
Massachusetts	--	--	--	--	228
Michigan	--	5,223	--	--	--
Missouri	--	50	--	--	--
New Hampshire	--	--	--	--	3
New Jersey	235	5,126	35,490	1/ 23,062	15
New York	98	18,386	33,003	42,365	11
North Carolina	29	--	--	--	--
Ohio	--	480	--	--	--
Pennsylvania	94	14,799	10,310	29,984	--
Rhode Island	--	--	--	--	48
Tennessee	10	--	--	--	--
Vermont	4	2,112	1,500	--	11
Virginia	113	607	--	--	--
West Virginia	--	25	--	--	--
Wisconsin	--	207	--	--	--
Total	971	49,929	80,303	95,411	389

1/ In addition, ~~14,866~~ acres were treated mechanically (trapping saturation).
14,886

Table 10. Japanese beetle, fiscal year 1966

State	Survey and Detection			Control	Regulatory	
	Area surveyed	Sites trapped	Area infested outside regulated area	Area treated chemically	Area treated Soil	Commodity treatments
	Acres	Number	Acres	Acres	Acres	Number
Alabama	3,628	386	--	--	--	--
Arkansas	--	223	--	--	--	--
California	4,150	4,862	--	--	--	--
Colorado	--	119	--	--	--	--
Connecticut	--	--	--	--	648	48
Delaware	--	--	--	--	476	31
District of Columbia	--	--	--	--	--	1
Florida	--	245	--	--	--	~~41~~ 0
Georgia	1,691	1,434	89,730	1,904	345	-- 41
Hawaii	--	10	--	--	--	~~10~~ 0
Illinois	80	5,423	4,158	18,482	--	~~18~~ 10
Indiana	38	1,940	54	54	299	-- 18
Iowa	362	2,417	--	--	--	--
Kansas	--	235	--	--	--	--
Kentucky	1,035	4,038	750	780	--	--
Louisiana	--	88	--	--	--	--
Maine	--	885	--	--	--	3
Maryland	--	--	--	--	164	242
Massachusetts	--	--	--	--	6	157
Michigan	--	17,436	1,948	1,599	--	--
Minnesota	--	1,164	--	--	--	--
Mississippi	--	313	--	--	--	--
Missouri	31	6,354	530	730	--	--
Nebraska	--	83	--	--	--	--
Nevada	--	28	--	--	--	--
New Hampshire	--	--	--	--	--	10
New Jersey	--	--	--	--	1/ 833	333
New Mexico	--	11	--	--	--	--
New York	--	--	--	--	128	86
North Carolina	12,087	8	3,877	141	307	525
North Dakota	--	63	--	--	--	--
Ohio	1,638	1,334	34	167	1/ 1,219	282
Oklahoma	--	92	--	--	--	--
Oregon	--	143	--	--	--	--
Pennsylvania	--	--	--	--	54	111
Rhode Island	--	--	--	--	144	47
South Carolina	1,395	981	640	--	--	1
South Dakota	--	114	--	--	--	--
Tennessee	25,963	~~2,223~~ 2235	553	4,610	1/ 18	15
Texas	--	~~183~~ 177	--	--	--	--
Vermont	--	--	--	--	~~626~~	2
Virginia	--	--	--	--	626	58
Washington	--	60	--	--	--	--
West Virginia	--	--	--	--	1/ --	15
Wisconsin	--	1,071	--	--	--	--
Wyoming	--	24	--	--	--	--
Total	52,098	63,996	102,274	28,467	5,267	2,036

1/ Foliar sprays - New Jersey 2,575 acres; Ohio 2,480 acres; Tennessee 4 acres; and West Virginia 1,350 acres.

Table 11. Khapra beetle, fiscal year 1966

U.S. and Mexico State	Survey and Detection: Properties surveyed	Survey and Detection: New properties infested	Control: Area fumigated	Regulatory: Properties regulated
	Number	Number	Cubic feet	Number
Alabama	157	--	--	--
Arizona	2,946	--	--	1
Arkansas	275	--	--	--
California	3,442	1	2,662,000	1
Delaware	32	--	--	--
Florida	48	--	--	--
Georgia	27	--	--	--
Illinois	4	--	--	--
Indiana	11	--	--	--
Iowa	110	--	--	--
Kentucky	52	--	--	--
Louisiana	907	--	--	--
Maryland	54	--	--	--
Michigan	17	--	--	--
Mississippi	83	--	--	--
Missouri	81	--	--	--
New Jersey	86	--	--	--
New Mexico	183	--	--	--
New York	4	--	--	--
North Carolina	125	--	--	--
Ohio	109	--	--	--
Oklahoma	402	--	--	--
Pennsylvania	58	--	--	--
South Carolina	59	--	--	--
Tennessee	224	--	--	--
Texas	2,978	--	--	1
Virginia	1	--	--	--
Washington	379	--	--	--
Baja California	58	--	--	--
Chihuahua	24	--	--	--
Coahuila	3	--	--	--
Durango	5	--	--	--
Nuevo Leon	21	--	--	--
San Luis Potosi	4	--	--	--
Sinaloa	115	--	--	--
Sonora	152	--	--	--
Tamaulipas	647	--	--	--
Vera Cruz	684	--	--	--
Total	14,567	1	2,662,000	3

Table 12. Mediterranean fruit fly, fiscal year 1966

U.S. and Mexico State	Survey and Detection		Control
	Traps installed	Groves or host areas infested	Area treated
	Number	Acres	Acres
Arizona	45	--	--
Florida	33,594	--	--
Louisiana	25	--	--
Mississippi	9	--	--
Texas	1/ 1,600	1/ 10,000	2/ 10,033
Baja California	25	--	--
Campeche	68	--	--
Chiapas	2,003	--	--
Colima	12	--	--
Distrito Federal	75	--	--
Guerrero	249	--	--
Hidalgo	22	--	--
Jalisco	26	--	--
Mexico	55	--	--
Nuevo Leon	35	--	--
Oaxaca	34	--	--
Puebla	13	--	--
Sinaloa	39	--	--
Sonora	273	--	--
Tabasco	27	--	--
Tamaulipas	718	--	400
Veracruz	286	--	--
Yucatan	173	--	--
Quintana Roo	237	--	--
Total	39,643	10,000	10,433

1/ Data from narrative report, June 1966.

2/ Reported under Insect Detection (ID), data processing print-out.

Table 13. Mexican fruit fly, fiscal year 1966

U.S. and Mexico State	Survey and Detection: Traps installed	Survey and Detection: Area infested	Control: Biological sterile flies released 1/	Regulatory: Commodity treatments
	Number	Acres	Units	Number
Arizona	254	--	--	--
California	3,869	--	--	--
Florida	739	--	--	--
Texas	544	21	--	781
Baja California	795	--	9,420	--
Sonora	100	--	--	--
Total	6,301	21	9,420	781

1/ Units of 1,000.

Table 14. Mormon cricket, fiscal year 1966

State	Survey and Detection: Area infested 1/	Control: Area treated
	Acres	Acres
Arizona	8,500	--
Idaho	--	10,300
Wyoming	10,600	--
Total	19,100	10,300

1/ Adult survey, 1965.

Table 15. Peach mosaic, fiscal year 1966

State	Survey and Detection		Control	Regulatory
	Properties surveyed	Properties infested	Plants removed	Nurseries inspected
	Number	Number	Number	Number
Arkansas	178	~~19~~ 0	--	--
California	1,841	19	32	110
Colorado	1,302	38	50	2
Missouri	5	--	--	--
Oklahoma	74	3	3	113
Texas	161	8	13	93
Utah	775	--	--	--
Total	4,336	68	98	318

Table 16. Phony peach, fiscal year 1966

State	Survey and Detection		Control		Regulatory
	Properties surveyed	Properties positive (infested)	Area treated	Trees removed	Nursery sites approved
	Number	Number	Acres	Number	Number
Arkansas	125	10	--	20	--
Georgia	260	209	33	3,480	11
Louisiana	68	32	--	467	--
Mississippi	7	7	6	117	--
Missouri	70	1	--	1	--
South Carolina	287	58	275	150	--
Texas	137	8	--	40	33
Total	954	325	314	4,275	44

Table 17. Pink bollworm, fiscal year 1966

U.S. and Mexico State	Survey and Detection			Control	Regulatory
	Properties surveyed	Area surveyed	Traps installed	Area treated mechanically	Commodity treatments
	Number	Acres	Number	Acres	Number
Alabama	132	120	--	--	--
Arizona	23,143	15,834	152	326,616	148
Arkansas	12,480	200	--	1,178,294	100
California	1,852	285,181	948	--	--
Georgia	259	--	--	--	1
Kentucky	112	--	--	--	--
Louisiana	2,167	338	--	131,997	36
Mississippi	5,108	--	--	--	7
Missouri	314	--	--	--	--
Nevada	15	2,500	6	--	--
New Mexico	514	10,395	--	--	62
North Carolina	9	--	--	--	--
Oklahoma	470	60	--	50,840	28
Tennessee	719	--	39	--	33
Texas	6,086	43,031	--	1,872,639	966
Baja California	3,740	4,103	455	--	--
Chihuahua	145	3,169	--	~~92,533~~ 95,533	--
Coahuila	178	18,247	--	21,690	--
Durango	197	22,485	--	29,250	--
Nuevo Leon	29	118	--	1,562	--
Sinaloa	415	7,217	--	--	--
Sonora	1,589	42,464	156	--	--
Tamaulipas	1,048	4,898	--	122,944	--
Veracruz	19	--	--	--	--
Total	60,740	460,360	1,756	3,~~828~~,365 831	1,381

Table 18. Soybean cyst nematode, fiscal year 1966

State	Survey and Detection					Regulatory
	Properties surveyed	Area surveyed	Samples taken	Properties infested	Area infested	Commodity treatments
	Number	Acres	Number	Number	Acres	Number
Alabama	482	18,166	244	~~143~~ 143	~~15,046~~ 15 046	~~137~~ 137
Arkansas	5,768	264,595	9,138			
Delaware	2	2	--	--	--	--
Florida	68	1,905	--	--	--	--
Illinois	584	85,584	4,936	1	365	42
Iowa	2,243	35,266	2,028	--	--	8
Kentucky	267	20,282	1,260	1	15	741
Louisiana	476	29,436	1,143	--	--	--
Maryland	1	1	--	--	--	--
Mississippi	694	62,794	2,378	3	370	4
Missouri	1,064	47,608	4,117	12	870	366
New Jersey	642	17,630	197	--	--	--
North Carolina	2,578	36,243	3,098	131	5,245	148
Oklahoma	413	13,475	552	--	--	1
Pennsylvania	7	61	--	--	--	--
South Carolina	278	5,083	23	--	--	--
Tennessee	1,003	101,749	530	179	69,899	81
Virginia	1,913	19,551	23,189	30	3,629	3,056
Total	18,483	759,431	52,833	500	95,439	4,584

Table 19. Sweetpotato weevil, fiscal year 1966

State	Survey and Detection		Control		Regulatory
	Properties surveyed	Properties infested	Treated chemically	Treated mechanically	Commodity treatments
	Number	Number	Acres	Acres	Number
Alabama	4,018	132	761	--	--
Georgia	2,285	39	8	7	--
Louisiana	19,546	516	826	20,905	3,508
Maryland	1	--	--	--	--
Mississippi	6,460	133	--	--	45
North Carolina	14	--	--	--	--
South Carolina	3,974	30	634	--	--
Texas	1,727	178	586	--	--
Total	38,025	1,028	1/ 2,815	20,912	3,553

1/ Includes 329 acres herbicide treated.

Table 20. White-fringed beetle, fiscal year 1966

State	Survey and Detection		Control	Regulatory		
	Area surveyed	Area infested	Area treated	Commodity treatments	Area treated	
					Soil	Foliage
	Acres	Acres	Acres	Number	Acres	Acres
Alabama	363,195	47,927	27,643	170	14,101	6,481
Arizona	1	--	--	--	--	--
Arkansas	13,528	810	1,516	--	43	613
Delaware	1,083	--	--	--	--	--
District of Columbia	23	--	--	--	--	--
Florida	30,173	8,706	--	--	563	--
Georgia	113,648	29,314	1,103	903	1,396	--
Illinois	447	--	--	--	--	--
Indiana	130	--	--	--	--	--
Kentucky	12,330	468	501	--	--	--
Louisiana	42,149	9,673	1,433	70	747	1,020
Maryland	5,303	53	324	~~18~~19	8	--
Mississippi	31,769	6,641	475	74	438	53
Missouri	7,760	--	--	--	--	--
New Jersey	20	--	--	--	--	--
North Carolina	64,771	3,991	2,442	332	308	--
Oklahoma	82	--	--	--	--	--
Pennsylvania	188	--	--	--	--	--
South Carolina	33,897	696	666	8	11	--
Tennessee	110,794	10,482	5,478	101	2,018	653
Texas	165	--	--	--	--	--
Virginia	37,622	315	2,126	510	72	--
West Virginia	477	--	--	--	--	--
Total	869,555	119,076	43,707	~~2,186~~ 2,187	19,705	8,820

Table 21. Witchweed, fiscal year 1966

State	Survey and Detection		Control	Regulatory
	Area surveyed	Area infested	Area treated	Commodity treatments
	Acres	Acres	Acres	Number
Alabama	69,673	--	--	--
Arizona	730	--	--	--
Arkansas	9,414	--	--	--
Delaware	315	--	--	--
Florida	59,957	--	--	--
Georgia	6,178	--	--	--
Iowa	1,095	--	--	--
Louisiana	20,276	--	--	--
Maine	10	--	--	--
Maryland	4,650	--	--	--
Mississippi	17,188	--	--	--
Missouri	4,476	--	--	--
New Jersey	8,539	--	--	--
New York	780	--	--	--
North Carolina	484,421	13,784	413,988	2,891
Oklahoma	7,764	--	--	--
Pennsylvania	400	--	--	--
South Carolina	203,622	3,334	108,531	3,123
Tennessee	10,747	--	--	--
Texas	22,341	--	--	--
Virginia	15,877	--	--	--
West Virginia	346	--	--	--
Total	948,799	17,118	522,519	6,014

Table 22. Imported fire ant, fiscal year 1966

State	Survey and Detection		Control		Regulatory	
	Properties surveyed	Area infested	Area treated		Soil treated	Commodity treatments
			Ground	Air		
	Number	Acres	Acres	Acres	Acres	Number
Alabama	25,428	496,994	57,272	236,940	13,609	7
Arizona	28	--	--	--	--	--
Arkansas	11,854	26,250	5	61,900	--	--
Florida	13,925	1,412,124	743	~~690,414~~ 960414	3,834	--
Georgia	14,603	669,501	1,732	2,038,050	767	55
Louisiana	12,632	608,622	4,198	-- 1,331,307	1,082	63
Maryland	--	--	--	--	--	1
Mississippi	14,478	735,363	22,517	941,284	766	66
North Carolina	28,825	170,976	60	232,603	--	--
Oklahoma	242	--	--	--	--	--
South Carolina	11,813	128,111	7,916	28,509	17	--
Tennessee	27,897	--	--	--	--	--
Texas	31,186	333,645	785	202,307	448	13
Virginia	1,221	--	--	--	--	--
Total	194,132	4,581,586	95,228	6,033,314	20,523	205

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PART II

FISCAL YEAR 1956

AGRICULTURAL RESEARCH SERVICE
United States Department of Agriculture

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COOPERATIVE PROGRAMS

PLANT PEST CONTROL DIVISION

CENTRAL REGION

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AGRICULTURAL RESEARCH SERVICE

United States Department Of Agriculture

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INTRODUCTION

Accomplishments of the Central Region, Plant Pest Control Division, ARS, United States Department of Agriculture, fiscal year 1966, is the theme of this report.

All work and services performed was conducted cooperatively with appropriate agencies of the thirteen North Central States which comprise the Region.

Valuable support is gratefully acknowledged from individual counties, municipalities, farm organizations, the Crop Quality Council, various civic groups, and individuals.

Counsel received from other interested Federal agencies further strengthened our overall pest control efforts.

CENTRAL REGION

ORGANIZATION

BARBERRY ERADICATION

The common, or European, barberry was introduced into this country by early colonists and became widespread throughout the important grain-growing areas in the United States. Even before the Revolutionary War, farmers observed that stem rust was spread from the barberry to grain fields, and laws were passed condemning the pest. It was not until 1865, however, that scientists discovered the direct relationship between the barberry and the stem rust of small grains. The practical importance of this was overlooked for many years, and it was not until 1918, after the barberry had become widely distributed and had caused serious damage, that an eradication program was started.

Originally, 13 States, in cooperation with the Federal Government, inaugurated an active eradication program. Ultimately, the area was expanded to include 19 of the principal grain-growing States, 12 of which are within the boundaries of the Central Plant Pest Control Region.

Many of the eradication problems were solved with the availability of new and effective herbicides. Originally, in the Central Region, 676,180 square miles were scheduled for survey and eradication. Due to the vigorous and persistent efforts of the Federal Government and the cooperating States, there remain only 17,458 square miles that now require future work.

During the past fiscal year, some adjustments were made in personnel assignments and planning, resulting in more rework of previously infested areas. A substantial increase in the financial participation by Iowa made it possible to expand the field activities to areas overdue in rework. In some areas, to fully utilize manpower, personnel normally assigned to barberry eradication assisted with surveys and control activities on other Division programs.

Despite adjustments in plans and reassignment of personnel, good progress was made throughout the area. North Dakota is on maintenance, and the States of South Dakota, Indiana, and Nebraska are rapidly approaching this status. In the latter three States there remains a total of only 723 square miles that will require future survey. A number of problem areas still remain in Iowa, Minnesota, Ohio, and Wisconsin, where barberry bushes continue to recur. These areas were previously heavily infested with seeding bushes, resulting in continued reinfestation. The problem is more difficult because these areas constitute extremely rough terrain with unusually heavy and brushy vegetation. As a result of surveys, 2,020 square miles were placed on maintenance.

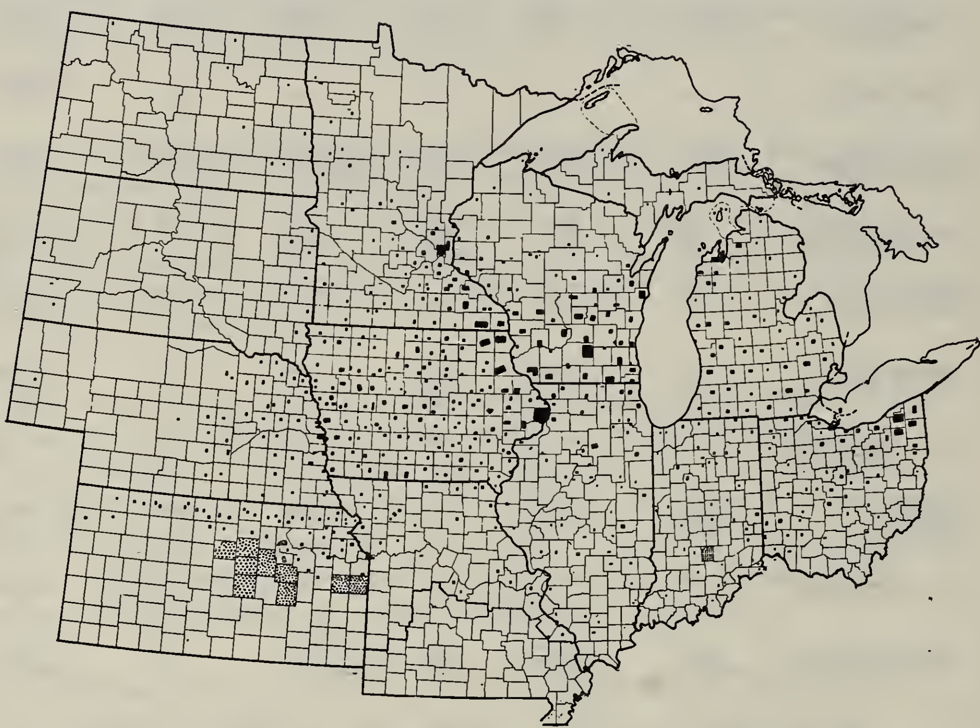
In the regulatory activities, nurseries and dealers were approved to ship interstate barberry, mahonia, and mahoberberis in accordance with provisions of the black stem rust quarantine.

Barberry Eradication - FY 1966

State	Survey and Detection: Square Miles Surveyed	Survey and Detection: Properties Reinspected	Survey and Detection: Properties with Bushes	Control: Plants Destroyed	Regulatory: Nurseries Inspected: Number	Regulatory: Nurseries Inspected: Acres	Regulatory: Other Props. Inspected
Illinois	132	316	29	62	32	4,122	4
Indiana	20	63	3	4	14	819	0
Iowa	756	736	73	398	8	4,387	0
Kansas	1,058	20	58	251	20	1,574	0
Kentucky	-	-	-	-	11	1,367	0
Michigan	268	1,063	299	3,105	24	1,695	0
Minnesota	96	157	80	811	30	2,316	20
Missouri	61	305	8	14	12	2,140	0
Nebraska	44	196	14	75	3	1,178	0
N. Dakota	0	0	0	0	1	26	2
Ohio	150	284	75	855	51	5,270	0
S. Dakota	5	8	0	0	1	250	6
Wisconsin	122	309	90	11,815	6	1,021	2
Totals	2,712	3,457	729	17,390	213	26,165	34

BARBERRY ERADICATION - CENTRAL REGION

Status July 1, 1966



Area requiring intensive work	10,759	square miles
Area requiring farmstead work	6,699	square miles
Area on maintenance	658,615	square miles

PRESENT STATUS, PROGRESS, AND FUTURE REQUIREMENTS, 1918-1966

State	Square Miles										Properties			Barberry Bushes Destroyed		
	Total in State to be Worked	Number Covered				Number Requiring Work One or More Times				No. Requiring No Future Work	Total Found to Date	No. Needing One or More Reinspections	Number Completed	Common	Native	Total to Date
		Initial Work		Rework		Farmstead		Intensive								
		Farmstead	Intensive	Farmstead	Intensive	Initial	Rework	Initial	Rework							
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)
Illinois	56,043	56,043	34,680	4,659	8,309	0	0	0	554	55,489	20,078	1,941	18,137	2,661,704	89,781	2,751,485
Indiana	36,045	36,045	27,333	8,405	3,608	0	299	0	167	35,579	7,016	663	6,353	200,346	212,118	412,464
Iowa	56,167	56,167	44,669	4,910	14,661	0	0	187	3,158	52,822	15,983	4,089	11,894	1,332,210	125	1,332,335
Kansas	32,257*	25,876	0	0	0	6,400*	0	0	339	25,518	478	478	0	6,685	1	6,686
Michigan	57,481	57,481	26,637	17,096	12,400	0	0	0	995	56,486	19,571	4,099	15,472	6,754,534	16	6,754,550
Minnesota	80,883	80,883	32,958	28,742	9,045	0	0	0	1,117	79,766	9,470	2,013	7,457	1,021,049	0	1,021,049
Missouri	37,286	19,735	17,749	789	1,113	0	0	20	101	37,165	1,955	425	1,530	24,720	0	24,720
Nebraska**	77,268	77,268	36,832	34,966	7,534	0	0	0	234	77,034	4,941	212	4,729	149,499	0	149,499
North Dakota	70,183	70,183	1,276	30,105	430	0	0	0	12	70,171	1,084	12	1,072	39,565	0	39,565
Ohio	40,740	40,740	32,197	6,289	13,284	0	0	0	1,172	39,568	17,851	1,983	15,868	3,829,874	0	3,829,874
South Dakota	76,868	76,868	12,906	4,538	1,582	0	0	0	23	76,845	1,574	38	1,536	136,508	0	136,508
Wisconsin	54,852	54,852	21,314	23,886	12,943	0	0	0	2,680	52,172	18,218	4,251	13,967	5,749,273	0	5,749,273
Totals	676,073	652,141	288,551	164,385	84,909	6,400	299	207	10,552	658,615	118,219	20,204	98,015	21,905,967	302,041	22,208,008

*Wilson County deleted. Should not have been included.

**Changes made in columns 12, 14, and 17, based on office review of Forms L.

Test of Berberis and Mahonia Species with P. graminis

Berberis pruinosa-longifolia (from U. S. Plant Introduction Station, Glenndale, Maryland), Mahonia aquifolium 'Donewell' (from Donewell Nurseries, Painesville, Ohio), and M. aquifolium 'Orange Flame' (from Fairview Floral Nurseries, Westlake, Ohio) were found resistant in final tests with P. graminis. Berberis veitchii (from U. S. Plant Introduction Station) was found to be susceptible to P. graminis.

Tests of B. sikkimensis (from University of Washington Arboretum) and B. thunbergi atropurpurea 'Golden Ring' (from Gerald Klyn Nursery, Mentor, Ohio) are not yet complete. These varieties are thought to be hybrids and therefore require a test of the progeny for final evaluation. Attempts to produce seed have been unsuccessful.

Mahonia aquifolium 'King's Ransom' (from Phytotektor Nursery, Winchester, Tennessee) and M. repens var. rotundifolia (from U. S. Plant Introduction Station) are currently under test, although the latter grows very poorly in the greenhouse, making testing difficult.

Plants were received of B. thunbergi atropurpurea rosa 'Pink Daw Berry' from the Old Farm Nursery, Boskoop, Holland, through the U. S. Plant Introduction Station, but all the plants were dead. This variety was requested by Congdon's Wholesale Nursery, North Collins, New York.

CEREAL LEAF BEETLE

Cereal leaf beetles were discovered in Berrien County, Michigan, in 1962. This pest had been known to cause economic damage to small grains in Russia, Hungary, Romania, Spain, and Great Britain, where total loss of the crop was sometimes recorded. Observations in Michigan and Indiana have established the fact that serious damage, particularly to oats, can be expected in this country in areas of heavy beetle populations.

So far, in this country, the most serious damage has been to oats. This, no doubt, is because of the low acreage of barley in the infested area. Lesser damage and heavy feeding have been observed on winter wheat and corn.

Intensive surveys by Plant Pest Control and cooperative personnel revealed that the cereal leaf beetle (Oulema melanopus) continued to spread during fiscal year 1966, and, by June 30, 1966, its presence had been confirmed in 173 counties in 4 States, as indicated in the following table.

State	Total No. Counties Infested to Date				
	1962	1963	1964	1965	1966
Illinois	0	0	0	3	3
Indiana	2	25	32	38	54
Michigan	2	15	34	43	53
Ohio	0	1	18	49	63
Totals	4	41	84	133	173

Surveys in States other than Illinois, Michigan, Ohio, and Indiana continue negative.

Observations indicate the following: (1) The infested area has continued to extend to the north, east, and south, until it is within one township of the western border of Pennsylvania and within 5 or 6 miles of the State of Kentucky; (2) the heaviest infestation and areas where economic damage to small grains is in evidence are extreme southwest Michigan and the adjacent area in Indiana; (3) areas of heavy populations, where economic damage is likely to occur, are expanding to the north and east in Michigan and to the south and east in Indiana.

Cooperative control during fiscal year 1966 resulted in application of low-volume malathion--95 percent technical grade--to 1,616,807 acres of infested area in Illinois, Indiana, and Michigan.

In Illinois, 11,186 acres were treated in Kankakee, Vermilion, and Will Counties in July of 1965. These areas included the spots where infestation was first discovered in the State. For the 1965 treatments, malathion application was at the rate of 5 ounces per acre.

During the period April 25 to May 16, 1966, an area encompassing 101,118 acres in Illinois and 653,596 acres in Indiana was treated by aerial application at the rate of 4 ounces per acre. The area treated consisted of a block averaging about 16 miles in width and 80 miles in length and including light infestation on the western periphery of the infested area. The purpose of treating this area was to delay westward movement of the cereal leaf beetle, and the effort appears to have been successful.

Two B-17's crossing in center of treatment area, using this method of guiding each other. (Photo by Department of Natural Resources, State of Indiana.)

In Michigan, an area including 757,340 heavily infested acres was treated by air, with 4 ounces malathion per acre. Of this area, 93,567 acres received the second treatment 8 to 10 days following the first application, making a total of 850,907* acres treated in Michigan. The purpose of the Michigan control was to reduce population pressures, thereby lessening the areas of heavy buildup and infestation explosions. These treatments, too, appear to have been successful, as evaluation observations indicate 97.8 percent of the beetles present were killed.

*This figure does not include 20,480 acres treated for research purposes. (This was a part of the area receiving two previous applications.)

Flashing beacon at top of pole mounted on Jeep was used to guide airplanes on CLB spray program. Pole was raised and lowered pneumatically. A beacon-equipped Jeep was required at either end of the spray strip.

Artificial movement of the cereal leaf beetle was prevented insofar as possible by uniform State quarantines imposed by the States of Indiana, Michigan, and Ohio. In July 1965 fifty counties were added to the regulated area, as follows:

10 additional counties in Michigan
9 additional counties in Indiana
31 additional counties in Ohio

Since all of the sites where beetles were found in Illinois were adequately treated, no Illinois counties were regulated during fiscal year 1966.

Articles regulated to prevent artificial movement of the cereal leaf beetle included, among other things, hay, straw, and small grains. After a review by the committee, shelled corn has been removed from the list of regulated articles as the pest risk associated with its movement did not justify certification effort.

Hay fumigation and certification required tremendous effort by inspectors to constantly check fumigation stations under compliance agreements to ascertain that proper procedures were being followed. Several years of continuous drought in eastern United States caused large quantities of hay to be imported from the regulated area. During the year, it is estimated that about 70,000 tons of hay and straw were fumigated prior to movement. Millions of bushels of small grains were treated by local elevators and/or terminals before being shipped from the regulated area.

Cereal Leaf Beetle - FY 1966

State	Survey & Detection: Surveyed: (No. of Stops)	Survey & Detection: Infested Acres	Control: Acres Treated	Regulatory: Properties Inspected	Regulatory: Commodity Treatments: Hay, Straw (Tons)	Regulatory: Commodity Treatments: Small Grains (Bushels)
Illinois	2,445	3,840	112,304	28	0	0
Indiana	1,381	21,440	653,596	935	4,415	5,000,000
Iowa	205	0	0	0	0	0
Kentucky	998	0	0	14	0	0
Michigan	8,524	3,704,824	861,147	2,722	14,926	15,171,460
Missouri	262	0	0	0	0	0
Ohio	3,333	92,000	0	3,896	65,780	38,880,900
Wisconsin	308	0	0	0	0	0
Totals	17,456	3,822,104	1,627,047	7,595	85,121	59,052,360

Biological Control Station - Cereal Leaf Beetle

A cereal leaf beetle biological control station was established at 2534 South 11th Street in Niles, Michigan, on February 1, 1966.

Mr. H. L. Maltby was transferred from the Laboratorio de Control Biologico, Mexico, to Niles as the Station Supervisor. Mr. F. M. Phillips was transferred from the Eastern Region to be his assistant. One GS-5 Inspector has since been assigned to this station.

Mr. Leon Coles, Insect Identification and Parasite Introduction Branch, Entomology Research, brought two parasite colonies (an egg parasite, Anaphes Spp., and a larval parasite, Tetrastichus julis) to the station on March 29. The larval parasites refused to lay eggs, and the culture did not survive. The colony of Anaphes is still being maintained.

Collection of adult cereal leaf beetles in the field to establish a large laboratory colony has been started. This colony will be used to reproduce itself as well as to provide food for the *Anaphes* parasite or other parasites that may become available.

By the end of the fiscal year, the station had been supplied with most of the essential equipment.

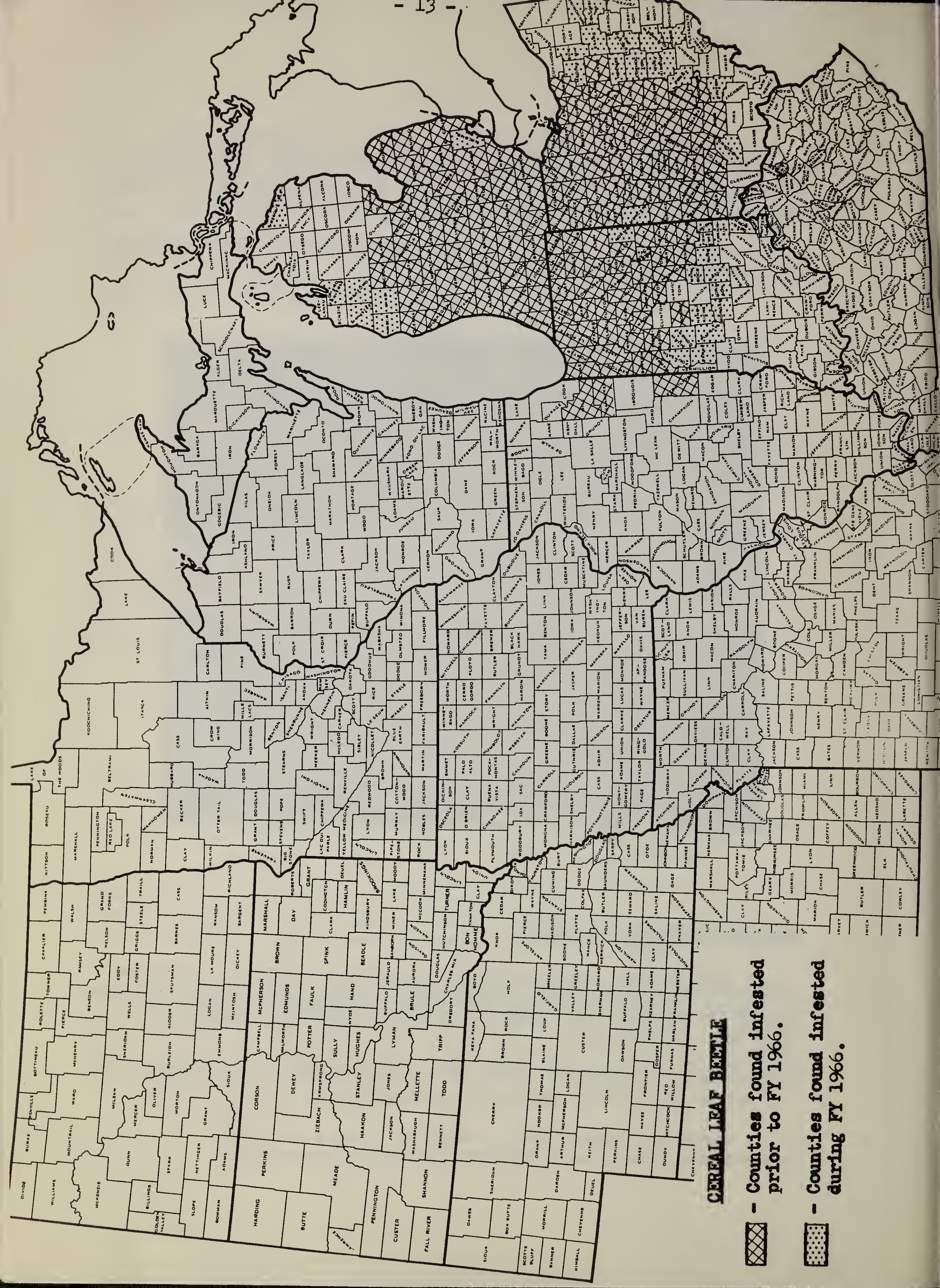
New Biological Control Station, Niles, Michigan

Methods Improvement Station

The Methods Improvement Station at Niles, Michigan, continued to assist in the solution of regulatory, survey, and control problems. During fiscal year 1966, some of their most important assignments included:

1. Conducting fumigation tests with methyl bromide to determine cereal leaf beetle mortality at temperatures down to 10° F.

2. A series of rollers and a method of using a tarpaulin under boxcars were developed to improve fumigation procedures.


CEREAL LEAF BEETLE
- Counties found infested prior to FY 1966.
- Counties found infested during FY 1966.

3. Phostoxin tests were run, and this material has now been added to treatments used for certification of stored small grains.

4. Improved survey procedures were possible by using a combine attachment designed and built by the Niles Methods Improvement staff. This extended the effective survey period.

5. Stickyboard traps were tested along with an easy method of applying tanglefoot in the field.

6. Test paint panels furnished by major auto manufacturers were exposed to malathion treatments used on control programs. The paint panels were then evaluated to see if damage to the paint might have occurred.

7. The Station also cooperated with Michigan State University in conducting a spray program on a 16-square-mile block, using multiple treatments. The object was to see if eradication is possible using multiple low-volume malathion treatments.

COOPERATIVE ECONOMIC INSECT SURVEY

A cooperative State-Federal insect reporting system was inaugurated in 1921 on a voluntary nationwide basis by interested economic entomologists and other cooperators in various States. After World War II, insect surveys, detection, and reporting gained in importance. The program was reactivated in 1951 in the Bureau of Entomology and Plant Quarantine and transferred to the Plant Pest Control Division. In 1951, Missouri became the first State in the Central Plant Pest Control Region to negotiate and put into effect this expanded survey program. It was followed by Illinois, Kansas, Minnesota, and South Dakota in 1954, and Nebraska, North Dakota, and Wisconsin in 1955. Since then, Indiana, Michigan, and Ohio have also become participants.

Iowa cooperators have indicated an interest in the Cooperative Economic Insect Survey program. A meeting with those interested is planned for next fall.

Plant Pest Control employees worked closely with the Survey Coordinators and Survey Entomologists in their respective areas, advising them of program surveys and submitting numerous insect notes for their survey reports.

William Brandvik, a former Plant Pest Control employee, accepted a position as North Dakota Assistant State Entomologist and Survey Entomologist in January 1966.

One Insect Detection Workshop was held in the Region this year. State and Federal personnel from Nebraska and Kansas participated in a workshop at Marysville, Kansas, on April 7.

Chinch bugs were not a serious problem in the Region. Formal surveys were made in two States--Illinois and Indiana. Plant Pest Control personnel collected bunch grass samples and State cooperators examined them.

The annual potato psyllid survey was conducted in western Nebraska by State cooperators.

The European corn borer fall infestation survey was made in twelve of the thirteen North-Central States by State cooperators. This is a voluntary survey in which Kentucky does not participate.

Much interest was shown in the corn stunt disease in Ohio, southern Missouri, and adjoining States. Cooperators made the surveys and advised Plant Pest Control Supervisors of their findings.

EUROPEAN CHAFER

The European chafer (*Amphimallon majalis*) was first found in this country in Wayne County, New York, in 1940. During the following 20 years it was also identified from several other Eastern States. It was first discovered in the Central Plant Pest Control Region on June 28, 1965, when three adult beetles were trapped near the eastern edge of the city of Cleveland. Continued trapping and visual survey during the remainder of the 1965 survey season indicated an infestation estimated to include approximately 2,800 acres.

The European chafer is a serious pest of lawns, turf areas, pastures, legumes, and winter grains. Damage is done by the larval or grub stage, which feeds on the roots of plants, causing unsightly brown spots in yards and turf areas and loss of growing vigor.

In the fall of 1965 and spring of 1966, cooperative control treatments of 10 percent granular dieldrin were applied by employees of the Plant Pest Control Division, the State of Ohio, and the city of Cleveland to 2,303 acres by use of ground equipment. Time did not permit the treatments to be completed, so most of the area owned by the New York Central Railroad was not finished.

Survey was continued in this area as well as other parts of Cuyahoga, Ashtabula, and Lake Counties, Ohio, during the adult season of 1966. Use was made of both black light and chemical traps, as well as visual observations. After being set in one location for a week with negative results, traps were moved to new locations. Thus, it was possible to trap many more sites than the number of traps available for use.

The first flight of adults was observed in the known infested area the evening of June 22. During the last week of June, additional chafers were taken from outside the area known to be infested, some as far as three miles west of the treated area. Survey will be continued into fiscal year 1967.

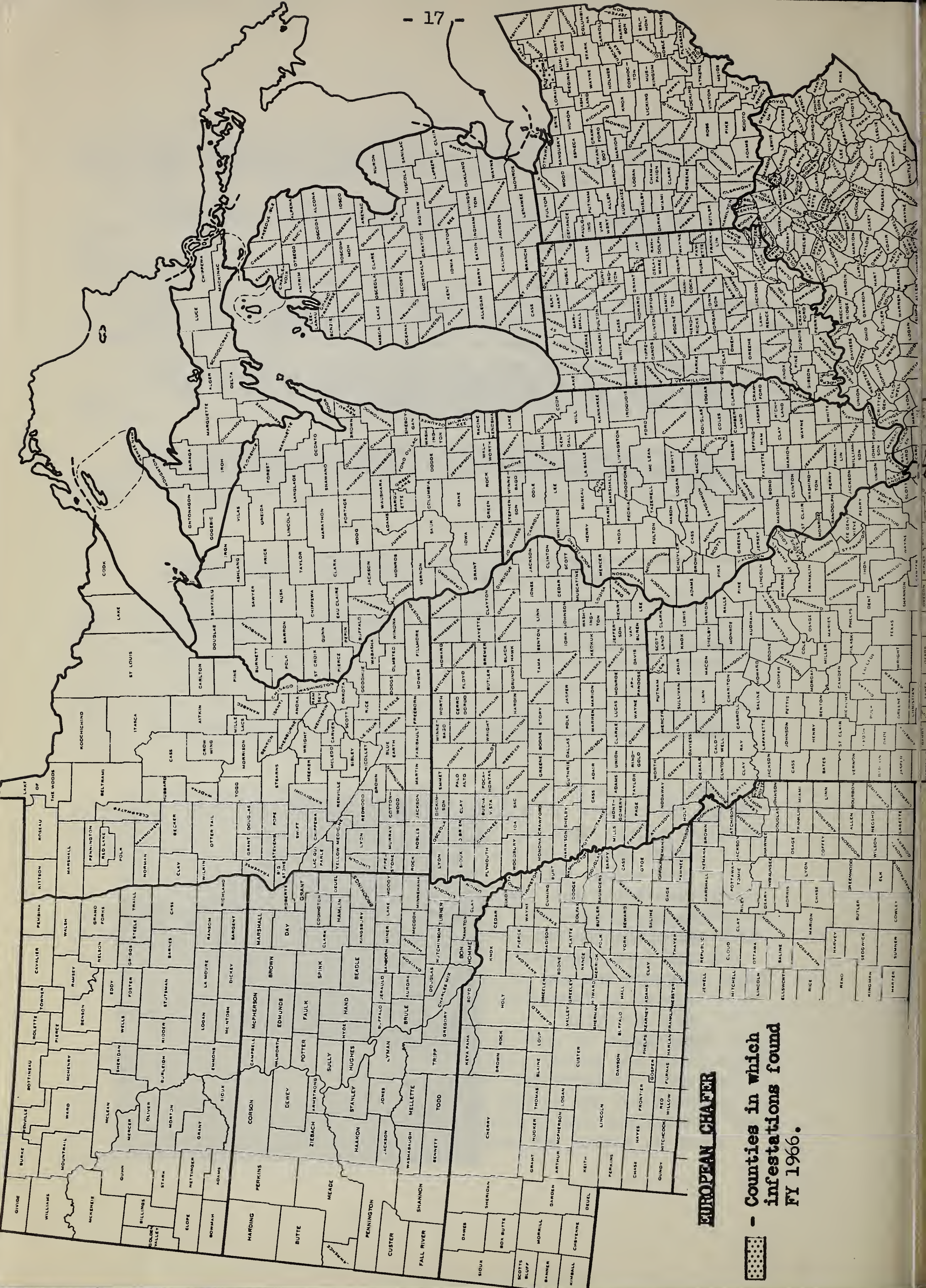
During the last week of June, foliage treatments were applied to "swarming" trees and shrubs to reduce the population and possible spread of adult chafers. Insecticide Sevin was applied at the rate of one pound actual ingredient to each gallon of mixture. A Buffalo turbine blower was used to make the application. From a plastic sheet spread under one of the treated "swarming" trees, 25 dead chafers were collected the following morning.

Following consultations with cooperators, decisions will be made concerning residual treatments to additional areas during the fall of 1966.

European Chafer - FY 1966

State	Survey & Detection		Control	Regulatory
	Sites Trapped	Props. Infested	Acres Treated	Properties Inspected
Ohio	473	7	2,303	0

Turf around this tree has been damaged by European chafers. The dead, browned patches usually appear in late fall or early spring.



EUROPEAN CHAFER

- Counties in which infestations found FY 1966.

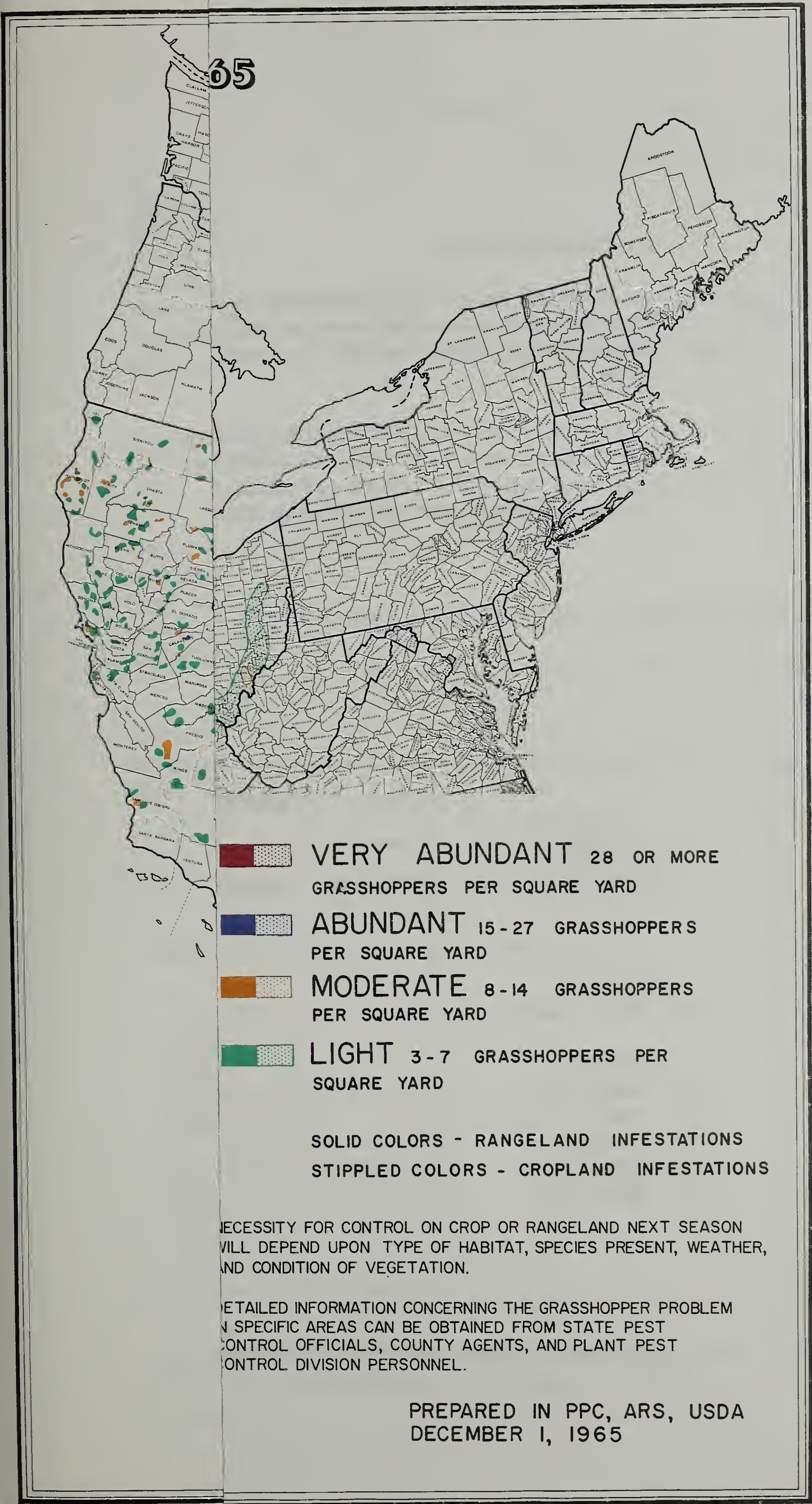
GRASSHOPPERS

From the time of the first settlers to the present, grasshoppers have occasionally been a serious problem to range forage and cultivated crops in this Region. The most recent serious outbreak of this pest occurred in the 1930's, during a period of extreme drought. Since that period, there have been more or less localized outbreaks of rangeland species in western Kansas, Nebraska, and the Dakotas. The same is true of cropland grasshoppers in the States to the east of the range areas. The evolution of methods of controlling this pest--from early-day baits to the present low-volume malathion spray--has done much to help in holding these insects in check by means of cooperative State-Federal control programs as well as through the individual efforts of farmers and ranchers.

Grasshopper populations remained generally non-economic over the Region the past year. There appeared to be a trend, however, toward potential increases in areas having some damaging populations last year. These include the southeast one-fourth, the north-central, and spotted areas in western South Dakota; southern one-third of Minnesota; certain counties in southern Wisconsin; and localities in northwestern and west-central Nebraska. Elsewhere, localized infestations caused some marginal damage to crops.

No cooperative State-Federal control programs were necessary in the range areas of the Region this year. In crop areas, farmers voluntarily did their own spraying where required or contracted for it with commercial applicators. Plant Pest Control Division personnel and cooperators supplied technical information to these farmers.

Adult grasshopper surveys were made by Plant Pest Control and State personnel last fall in portions of all States except Michigan and Kentucky. Both crop- and rangeland areas were included in this survey. The spring of 1966 was very cool and wet, and the hatching of grasshoppers was greatly delayed. By the end of June, many Central Region States were lacking moisture, and it was anticipated that grasshoppers might be of economic importance in some localities.



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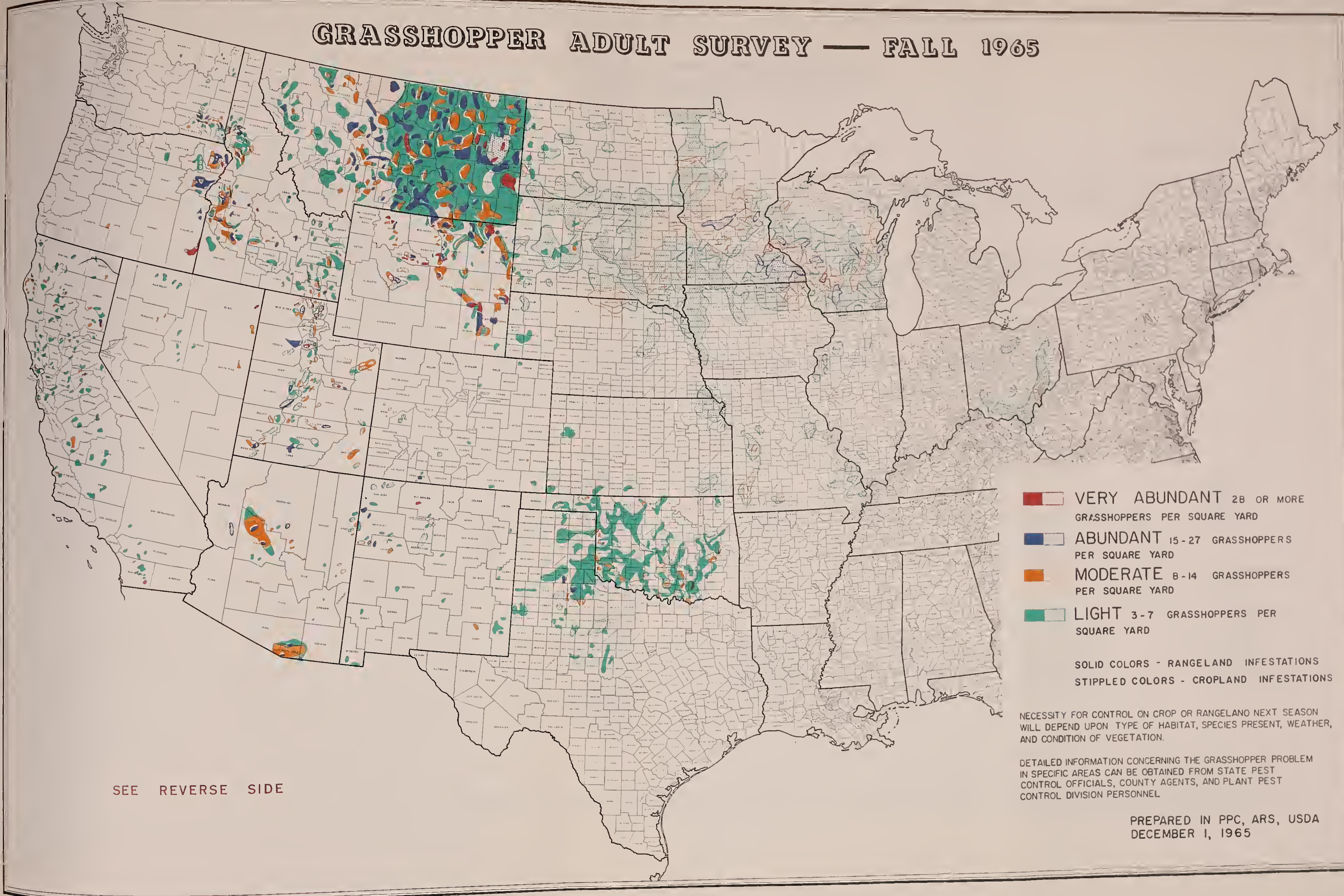

GRASSHOPPER ADULT SURVEY — FALL 1965
VERY ABUNDANT 28 OR MORE GRASSHOPPERS PER SQUARE YARD
ABUNDANT 15-27 GRASSHOPPERS PER SQUARE YARD
MODERATE 8-14 GRASSHOPPERS PER SQUARE YARD
LIGHT 3-7 GRASSHOPPERS PER SQUARE YARD
SOLID COLORS - RANGELAND INFESTATIONS
STIPPLED COLORS - CROPLAND INFESTATIONS
NECESSITY FOR CONTROL ON CROP OR RANGELAND NEXT SEASON WILL DEPEND UPON TYPE OF HABITAT, SPECIES PRESENT, WEATHER, AND CONDITION OF VEGETATION.
DETAILED INFORMATION CONCERNING THE GRASSHOPPER PROBLEM IN SPECIFIC AREAS CAN BE OBTAINED FROM STATE PEST CONTROL OFFICIALS, COUNTY AGENTS, AND PLANT PEST CONTROL DIVISION PERSONNEL.
PREPARED IN PPC, ARS, USDA
DECEMBER 1, 1965
SEE REVERSE SIDE

ıTURE

ıys made during the late summer and fall of 1965.
:es the potential severity of infestations for 1966.
:ate those areas where control may be necessary in

. on those lands will be handled by the farmers with
'eas, shown on the map in solid colors (orange, blue
ıaded areas on the map are diagrammatic. Within

' REGIONS, FALL 1965

Blue and Red)

	LANDOWNERSHIP - ACRES		TOTAL ACRES
	Private and State	Public Domain	
:ico	16,500	15,400	31,900
	280,700	320,000	600,700
	97,865	117,760	215,625
:ton	246,000	--	246,000
:	1,970,100	371,900	2,342,000
.a	342,500	--	342,500
	159,600	--	159,600

ultural Research Service, in cooperation with various

GPO 971-930

GYPSY MOTH

Some time prior to 1954, an infestation of the gypsy moth was found and eradicated in northern Ohio. In 1954, a similar infestation was found in Michigan, at Lansing, Ingham County, and across the line in Eaton County. From 1954 into 1961, infestations were found at various locations in Calhoun, Clinton, Eaton, Ingham, Ionia, and Shiawassee Counties, Michigan. The last moth trapped in that State was taken in late summer, 1961, and over 4,000 acres were treated during May of 1962. Intensive trapping, all negative, was done in these counties the past four years.

This fiscal year, traps were placed in five States in the Region: Iowa, Michigan, Missouri, Ohio, and Wisconsin. No gypsy moths were caught during the season.

Michigan again did intensive trapping in eight counties in the south-central part of the State. Over 5,000 traps were set in various localities. In the other States, the trapping was a detection-type survey. The traps were placed in State parks, public camp grounds, highway rest areas, near trailer parks, and other similar locations.

Inspections were made by Plant Pest Control Inspectors of Christmas trees received by wholesale dealers in Iowa, Kentucky, Missouri, and Ohio. No violation of the gypsy moth regulations were found.

Gypsy Moth - FY 1966

State	Survey & Detection: Sites		Control	Regulatory			
	Trapped	Positive	Saturation Trapping	Acres Inspected	Properties Inspected: Industry	Properties Inspected: Other	Acres Foliage Treated
Indiana	0	0	0	0	0	1	0
Iowa	50	0	0	0	11	5	0
Kentucky	0	0	0	0	3	0	0
Michigan	5,223	0	0	0	0	0	0
Missouri	50	0	0	0	0	14	0
Ohio	480	0	0	0	20	0	0
Wisconsin	207	0	0	0	0	0	0
Totals	6,010	0	0	0	34	20	0

UNITED STATES DEPARTMENT OF AGRICULTURE
Agricultural Research Service
Plant Pest Control Division

TO COOPERATORS:

This map is based upon the results of cooperative grasshopper adult surveys made during the late summer and fall of 1965. The survey reveals where and how many grasshoppers infest an area, and indicates the potential severity of infestations for 1966. Nymphal surveys, made in the spring, determine population densities, and indicate those areas where control may be necessary in 1966.

The infestations in croplands are shown on the map in stippling. Control on those lands will be handled by the farmers with technical assistance from Division and State personnel. The infested range areas, shown on the map in solid colors (orange, blue and red only), total 16,612,455 acres in 13 Western and Midwestern States. Shaded areas on the map are diagrammatic. Within these areas, infestations may be solid or spotted.

RANGELAND GRASSHOPPER INFESTATIONS - ACREAGE BY REGIONS, FALL 1965

(Moderate Populations or Above - Orange, Blue and Red)

REGION AND STATE	LANDOWNERSHIP - ACRES		TOTAL ACRES
	Private and State	Public Domain	
CENTRAL			
So. Dakota	32,250	6,490	38,740
WESTERN			
Arizona	1,274,000	537,200	1,811,200
California	125,010	2,000	127,010
Idaho	468,280	1,099,000	1,567,280
Montana	7,333,000	1,747,000	9,080,000
Nevada	--	49,900	49,900
New Mexico	16,500	15,400	31,900
Oregon	280,700	320,000	600,700
Utah	97,865	117,760	215,625
Washington	246,000	--	246,000
Wyoming	1,970,100	371,900	2,342,000
SOUTHERN			
Oklahoma	342,500	--	342,500
Texas	159,600	--	159,600

The survey was planned and performed by the Plant Pest Control Division, Agricultural Research Service, in cooperation with various State agencies concerned.

GPO 971-930

GYPSY MOTH

Some time prior to 1954, an infestation of the gypsy moth was found and eradicated in northern Ohio. In 1954, a similar infestation was found in Michigan, at Lansing, Ingham County, and across the line in Eaton County. From 1954 into 1961, infestations were found at various locations in Calhoun, Clinton, Eaton, Ingham, Ionia, and Shiawassee Counties, Michigan. The last moth trapped in that State was taken in late summer, 1961, and over 4,000 acres were treated during May of 1962. Intensive trapping, all negative, was done in these counties the past four years.

This fiscal year, traps were placed in five States in the Region: Iowa, Michigan, Missouri, Ohio, and Wisconsin. No gypsy moths were caught during the season.

Michigan again did intensive trapping in eight counties in the south-central part of the State. Over 5,000 traps were set in various localities. In the other States, the trapping was a detection-type survey. The traps were placed in State parks, public camp grounds, highway rest areas, near trailer parks, and other similar locations.

Inspections were made by Plant Pest Control Inspectors of Christmas trees received by wholesale dealers in Iowa, Kentucky, Missouri, and Ohio. No violation of the gypsy moth regulations were found.

Gypsy Moth - FY 1966

State	Survey & Detection: Sites: Trapped	Survey & Detection: Sites: Positive	Control: Saturation Trapping	Regulatory: Acres Inspected	Regulatory: Properties Inspected: Industry	Regulatory: Properties Inspected: Other	Regulatory: Acres Foliage Treated
Indiana	0	0	0	0	0	1	0
Iowa	50	0	0	0	11	5	0
Kentucky	0	0	0	0	3	0	0
Michigan	5,223	0	0	0	0	0	0
Missouri	50	0	0	0	0	14	0
Ohio	480	0	0	0	20	0	0
Wisconsin	207	0	0	0	0	0	0
Totals	6,010	0	0	0	34	20	0

JAPANESE BEETLE

The Japanese beetle was first discovered in this country near Riverton, New Jersey, in 1916. It increased and spread until, by June 30, 1966, the generally infested area extended westward to include the eastern third of Ohio, northern Indiana, and a few counties in Kentucky. There were also an increasing number of scattered, smaller infestations extending as far west as the Mississippi River. Both the adult and the grub stages of the Japanese beetle feed, so both are capable of causing serious damage to a large number of hosts. Besides many shrubs and flowers, soybeans and corn are favorite hosts.

Surveys conducted by specially designed traps in all States of the Region revealed new infestations in Indiana, Illinois, Michigan, Missouri, Ohio, and Kentucky during fiscal year 1966. Those infested sites which were not adequately treated or for which treatment was not planned were considered for regulation. In the States of Missouri, Indiana, Kentucky, Michigan, Illinois, and Ohio, residual soil treatments of dieldrin were made to 9,601 acres of new infestation to prevent the beetle from becoming established. In addition, 21 acres near East St. Louis, in St. Clair County, Illinois, were treated with milky spore disease (Bacillus popilliae) to determine if this method of control could be effective in that area.

Two Buffalo turbine blowers mounted on Jeeps spread milky spore disease granules near East St. Louis, Illinois. Three men accompany the vehicles to mark the area and guide the drivers.

Continued restrictions on the use of chlorinated hydrocarbon insecticides increased the difficulties associated with control of soil-inhabiting insects. To learn if repeated applications of Sevin would be effective in eradicating or greatly suppressing Japanese beetles, it was proposed to make four aerial applications of .8 pound per acre to approximately 8,000 acres near East St. Louis in Madison and St. Clair Counties. This undertaking was in conjunction with the Entomology Research Division, ARS; the Illinois Department of Agriculture; and the Illinois Natural History Survey. Before June 30, one application had been made to 12,129 acres. Three additional applications will be made at approximately 10-day intervals before results of effectiveness are determined.

Efforts were continued to encourage and assist authorities to residually treat the turf areas of airports, particularly those ports from which long-distance fast flights originate. Toward this objective, 176 acres were treated at the Akron-Canton Airport and the Cleveland-Hopkins Airport, both in the State of Ohio, and 2,125 acres were treated at Scott Air Force Base, Belleville, Illinois. Foliage applications of Sevin, using ground equipment, were continued to suppress adult populations at infested airports, thus reducing chances of beetles being carried to uninfested areas.

Four colonies of Tiphia vernalis were released in the Sheldon-Kentland infestation in Washington Township, Newton County, Indiana; and two colonies were released in Ohio, one near New Philadelphia in Tuscarawas County and one at the Boston Hills Country Club in Summit County. It is hoped that colonies of this parasite, which attacks the Japanese beetle in the grub stage, will become established in the infested areas.

In order to learn how effective LV Technical malathion, applied by ground equipment, is in reducing adult beetle populations, applications were made to borders of six fields of soybeans in Newton County, Indiana. Application was at the rate of 6 ounces per acre, using a Mini-spin nozzle attached to a Buffalo turbine blower. Two applications were made--one on August 4 and one on August 16. Observations indicated a marked reduction of beetles for a period of approximately 24 hours following each treatment.

Plant Pest Control personnel continued to assist plant-growing establishments and other segments of industry operating under the compliance agreement. Direction was provided for application of residual insecticides to nursery blocks and other methods of certifying regulated items moving from the generally infested area.

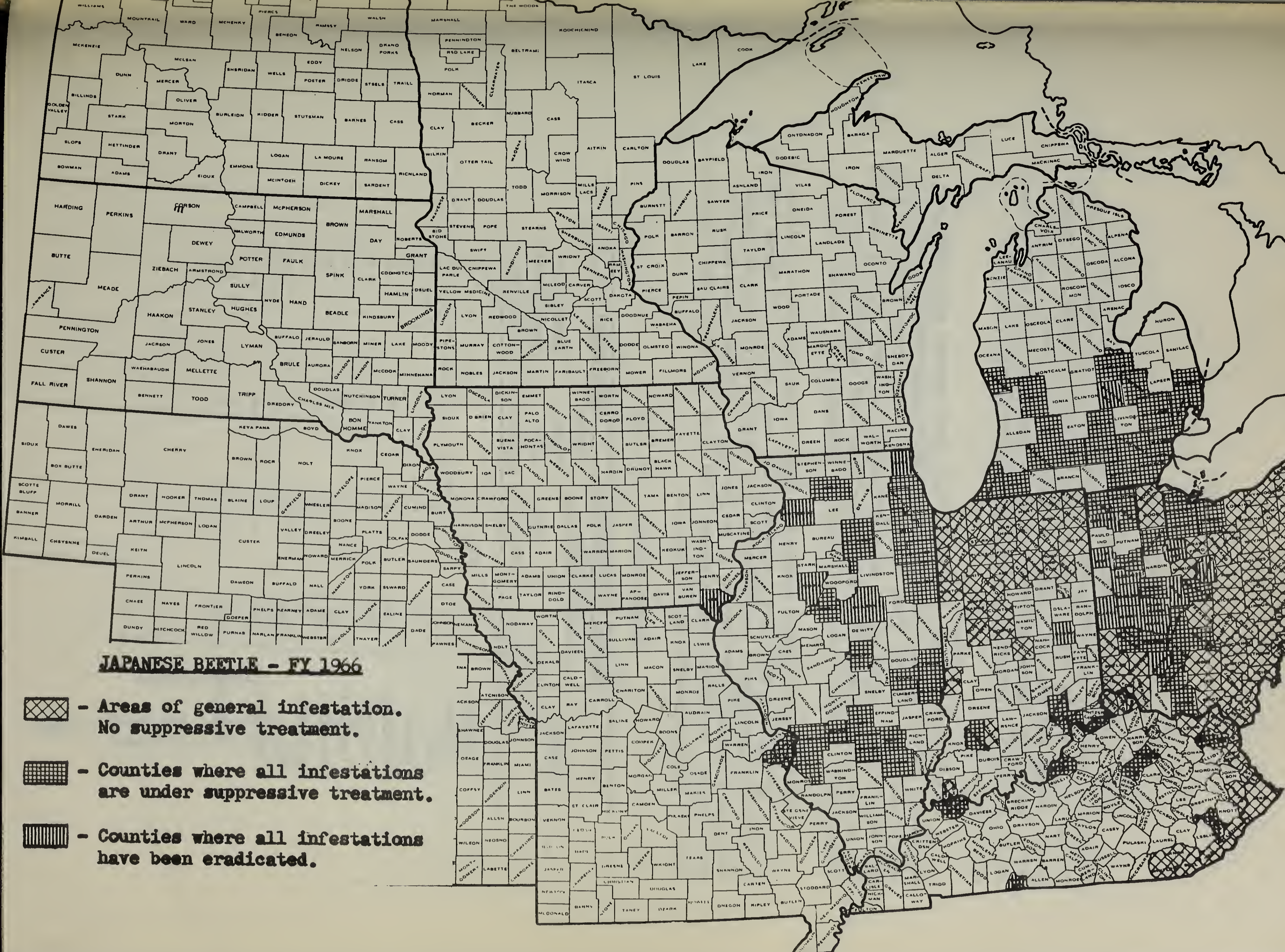
Japanese beetle grubs for use in milky spore disease research were collected again in the State of Ohio for use by the Northern Utilization Research and Development Laboratory at Peoria, Illinois. Two lots of grubs, totaling approximately 34,500, were collected by Plant Pest Control personnel and delivered to the laboratory.

Japanese Beetle - FY 1966

State	Survey and Detection: Sites Trapped	Survey and Detection: Acres Infested	Control: Chemical (Acres)	Control: Biol. (Parasites Released)	Regulatory: Properties Inspected	Regulatory: Commodity Treatments (Visits)	Regulatory: Acres Treated: Soil	Regulatory: Acres Treated: Foliage
Illinois	5,423	4,158	18,482	0*	4	10	0	0
Indiana	1,940	54	54	4**	646	18	299	0
Iowa	2,417	0	0	0	0	0	0	0
Kansas	235	0	0	0	0	0	0	0
Kentucky	4,038	750	780	0	12	0	0	0
Michigan	17,436	1,948	1,599	0	0	0	0	0
Minnesota	1,164	0	0	0	0	0	0	0
Missouri	6,354	530	730	0	0	0	0	0
Nebraska	83	0	0	0	0	0	0	0
N. Dakota	63	0	0	0	0	0	0	0
Ohio	1,334	34	167	2**	2,375	282	1,219	2,480
S. Dakota	114	0	0	0	0	0	0	0
Wisconsin	1,071	0	0	0	0	0	0	0
Totals	41,672	7,474	21,812	6	3,037	310	1,518	2,480

*21 acres milky-disease spore treatment.
**Tiphia colonies.

Colorado-bound car in rest area near Japanese beetle infested soybean field. The beans were sprayed the following day to help prevent hitchhiking beetles being carried away.


JAPANESE BEETLE - FY 1966
- Areas of general infestation. No suppressive treatment.
- Counties where all infestations are under suppressive treatment.
- Counties where all infestations have been eradicated.

KHAPRA BEETLE

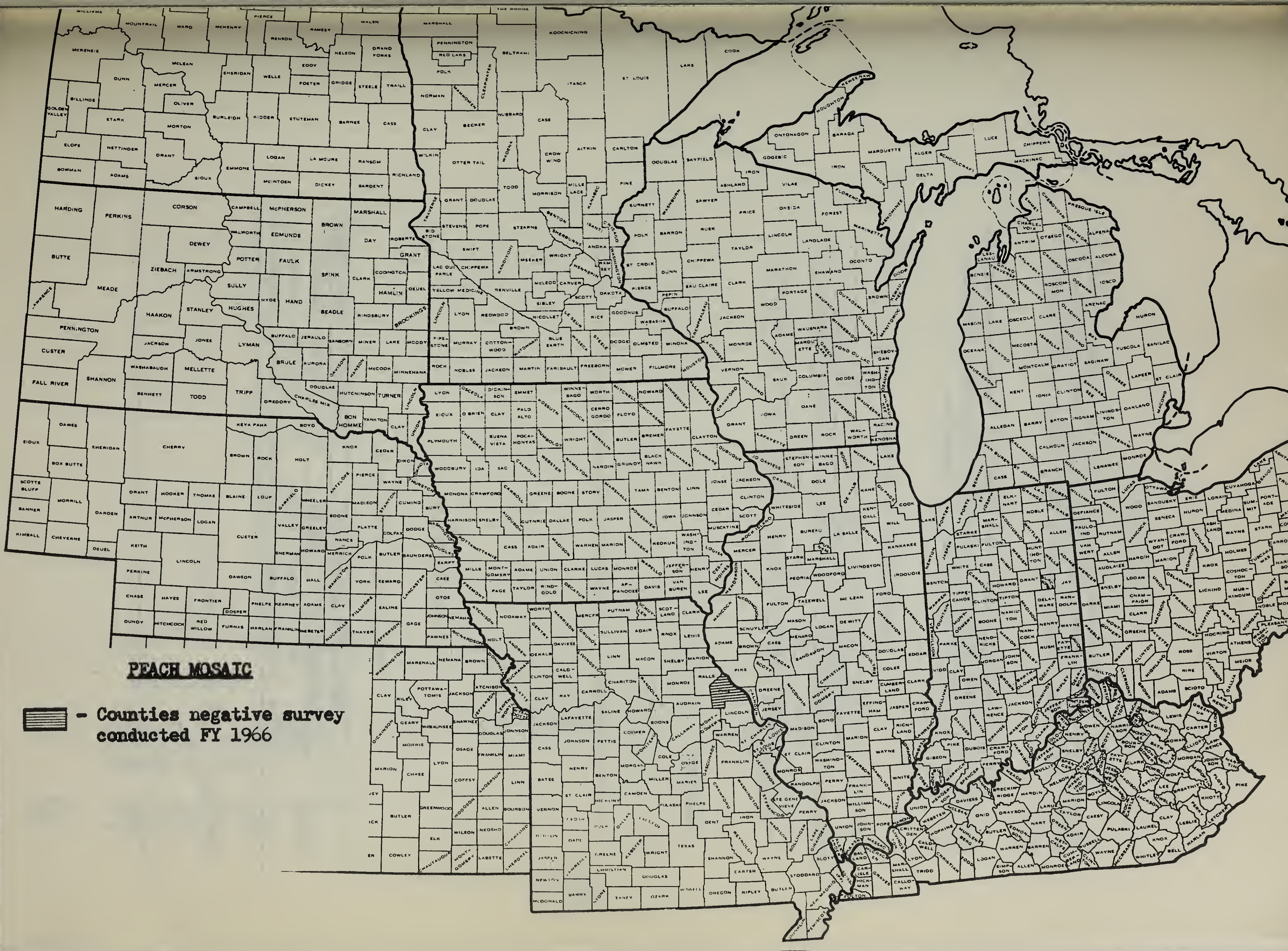
This stored-grain pest has not been found in the Central Region to date. Plant Pest Control Supervisors and other personnel in the Region began their first survey and control training assignments during the fall of 1955 in Arizona and California. Since then, they, and others who have received training, have made surveys of flour mills, elevators, warehouses, boxcars, etc., in their respective areas.

Plant Pest Control personnel this past season were involved in khapra beetle inspections in all areas in this Region. Numerous consignments of freight from foreign ships found to be infested with the beetle were inspected at destination and in many cases fumigated or treated with malathion. Such items included cases of roller chain, steel I beams, cases of jewelry, shipments of rubber, etc.

Many seed and grain establishments, flour milles, and other similar establishments were inspected the past year. In March 1966, 17 establishments were inspected in the Detroit metropolitan area. This was a cooperative survey in which four Michigan Department of Agriculture, two Plant Pest Control Division, and five Plant Quarantine Division personnel participated.

Khapra Beetle - FY 1966

State	Survey & Detection: Properties: Surveyed	Survey & Detection: Properties: Infested	Regulatory: Properties Inspected	Regulatory: Commodity Treatments (Visits)
Illinois	4	0	0	0
Indiana	11	0	0	2
Iowa	110	0	0	0
Kansas	0	0	4	0
Kentucky	52	0	0	0
Michigan	17	0	0	0
Minnesota	0	0	0	0
Missouri	81	0	0	0
Nebraska	0	0	1	0
Ohio	109	0	0	0
Wisconsin	0	0	1	0
Totals	384	0	6	2


PEACH MOSAIC
- Counties negative survey conducted FY 1966

PEACH MOSAIC

Peach orchards and nursery stock have been inspected annually for many years. All inspections have been negative, and to date this disease has not been found in the Central Region.

In June 1966, Federal and Missouri State personnel inspected the Stark Brothers Nursery at Louisiana, Missouri. The inspection of 235,000 trees was negative.

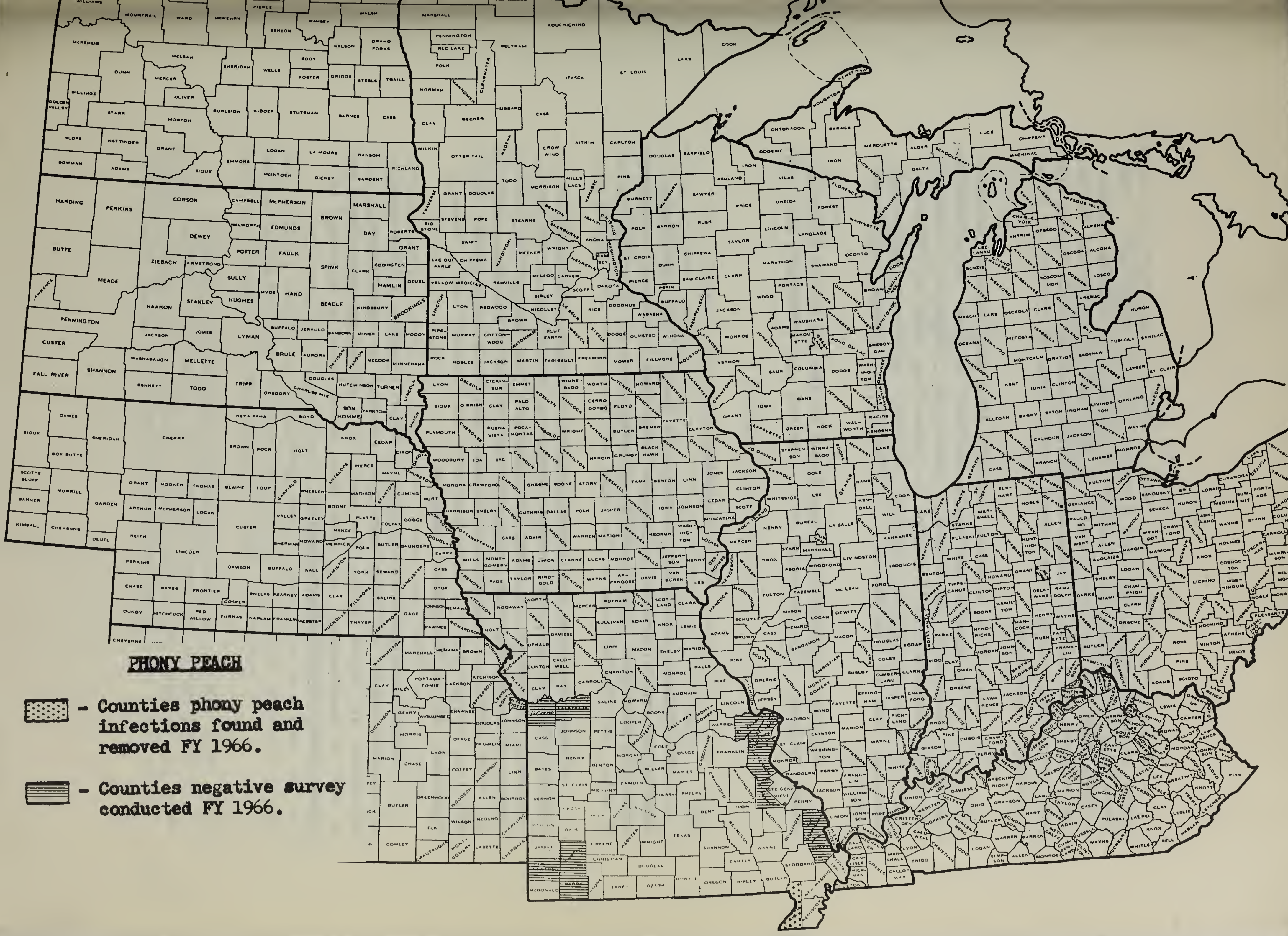
Peach Mosaic - FY 1966

State	Survey and Detection				Regulatory	
	Properties		Hosts		Acres Inspected	
	Surveyed	Infected	Surveyed	Infected	Nursery	Environs
Missouri	5	0	235,000	0	0	0

PHONY PEACH

Phony Peach - FY 1966

State	Survey and Detection				Control		Regulatory
	Properties		Hosts		Trees	Acres	Nursery
	Surveyed	Infected	Surveyed	Infected	Removed	Herbicided	Acres Inspected
Missouri	70	1	92,506	1	1	0	0


PHONY PEACH
- Counties phony peach infections found and removed FY 1966.
- Counties negative survey conducted FY 1966.

Phony peach disease has been of little consequence in Central Region peach orchards the past 8 years (1958-65, inclusive). Many trees have been inspected annually in orchards in extreme southeastern Missouri and occasionally in southern Illinois and Indiana and western Kentucky. During this 8-year period, 77 infected trees have been found in the four States, with about 50 percent of them in Missouri orchards.

The inspection of peach orchards this past season for the presence of this disease was again confined to those in 12 counties scattered throughout the southern two-thirds of Missouri. Federal and State personnel participated in inspecting over 92,000 trees in Barry, Cape Girardeau, Dunklin, Jackson, Jefferson, Lafayette, Lawrence, Newton, St. Charles, St. Francis, St. Louis, and Scott Counties.

Only one infected tree was found in the State--in a Dunklin County orchard. The property owner removed and destroyed the tree.

PINK BOLLWORM

Gin trash examination, cotton gin inspections, and spot-checking of cotton product shipments have long been used as survey tools for this pest in the cotton-growing areas of this Region. To date, no infestations of the pink bollworm have been found.

Cotton is grown in Fulton County, Kentucky, and in Butler, Dunklin, Mississippi, New Madrid, Pemiscot, and Scott Counties, Missouri. In the six southeastern Missouri counties, over 3,000 bushels of gin trash were inspected with negative results. Federal and State personnel cooperated in this gin-trash inspection. In addition, cotton gins in both Kentucky and Missouri were visually inspected, all with negative results.

Numerous shipments of cotton, cotton linters, cotton seed, and similar cotton products were spot-checked by supervisors throughout all areas during the year. All shipments were found to be used at destination, and none were reconsigned or diverted to points within the Southern Region.

Pink Bollworm - FY 1966

State	Survey & Detection Properties		Regulatory Properties Inspected	
	Surveyed	Infested	Industrial	Other
Illinois	0	0	68	0
Indiana	0	0	2	0
Kentucky	112	0	0	0
Michigan	0	0	1	0
Minnesota	0	0	8	0
Missouri	314	0	19	20
Ohio	0	0	5	0
Wisconsin	0	0	12	0
Totals	426	0	115	20

SOYBEAN CYST NEMATODE

The soybean cyst nematode was first discovered in the United States in New Hanover County, North Carolina, in the summer of 1954. In December of 1956 it was found in the bootheel county of Pemiscot, Missouri. To prevent spread of the pest to other soybean-growing States not known to be infested, a Federal quarantine was invoked in July 1957.

With the discovery of the soybean cyst nematode in Missouri in 1956, it became of great concern to the growers in the States of the Central Region. Approximately 16½ million acres of soybeans, or 80 percent of the country's average, is grown within the boundaries of the Central Plant Pest Control Region.

Since the discovery of the pest, nearly all of the principal soybean-growing areas in the Region have been surveyed. Surveys included soil sampling, inspection of plant roots, and the visual checking of fields of yellowing and dwarfing that might reveal nematode feeding.

Soil sampling is gradually being replaced by symptom surveys. When suspect fields are observed, root inspections are made and soil samples collected for further processing. Numerous positive fields have been reported by employing this type of survey.

Soybean cyst nematode infestation occurs in only three States of the Region. Generally, the infestations are in the parts of Illinois, Kentucky, and Missouri which border the Mississippi River. In the past, beans were grown on the same lands year after year,

thus building up high cyst populations. Since crop rotation is the only practical control, many growers now plant beans to these fields on a three- or four-year rotation.

As early as 1957, Federal and State researchers began a breeding program to develop a resistant bean which was also acceptable to the industry. In 1966 the cyst-nematode resistant soybean, Pickett, was distributed for increase to registered seed growers. It is expected that farmers can obtain seed of this variety for the 1967 planting. This cyst-resistant variety compares favorably in respect to yield with the commonly grown Lee variety. It is expected within the next several years Pickett and other resistant varieties will replace the susceptible varieties now grown, thus eliminating the economic damage caused by the cyst nematode.

During the past year, infestations were found for the first time in Henderson and McCracken Counties, Kentucky. Currently there are eleven counties infested in Missouri, seven in Kentucky, and five in Illinois. Losses to soybean crops in the infested areas during 1965 are estimated to be as follows:

State	Losses		
	No. Counties	Acres Infested	Losses in Dollars
Illinois	3	1,864	$ 9,000
Kentucky	1	39,000	296,595
Missouri	8	255,009	2,202,500
Totals	12	295,873	$2,508,595

For lack of any practical control means of preventing the spread of the cyst, emphasis continued to rely on regulatory activities. In addition to soybeans and other commodities, the principal and most hazardous means of spread is used farm machinery and construction equipment. At the Hale Auction Sales, Sikeston, Missouri, used farm machinery is shipped by rail and truck to numerous States outside of the regulated area. Other small auctions and individual sales in the three-state area continuously require regulatory attention. The map on the following page illustrates the volume of used machinery that passes through the Hale Auction yard alone and the various State destinations. 7

DISTRIBUTION OF FARM MACHINERY AND OTHER EQUIPMENT CERTIFIED FOR MOVEMENT FROM SOYBEAN CYST NEMATODE REGULATED AREA IN MISSOURI DURING FY 1966

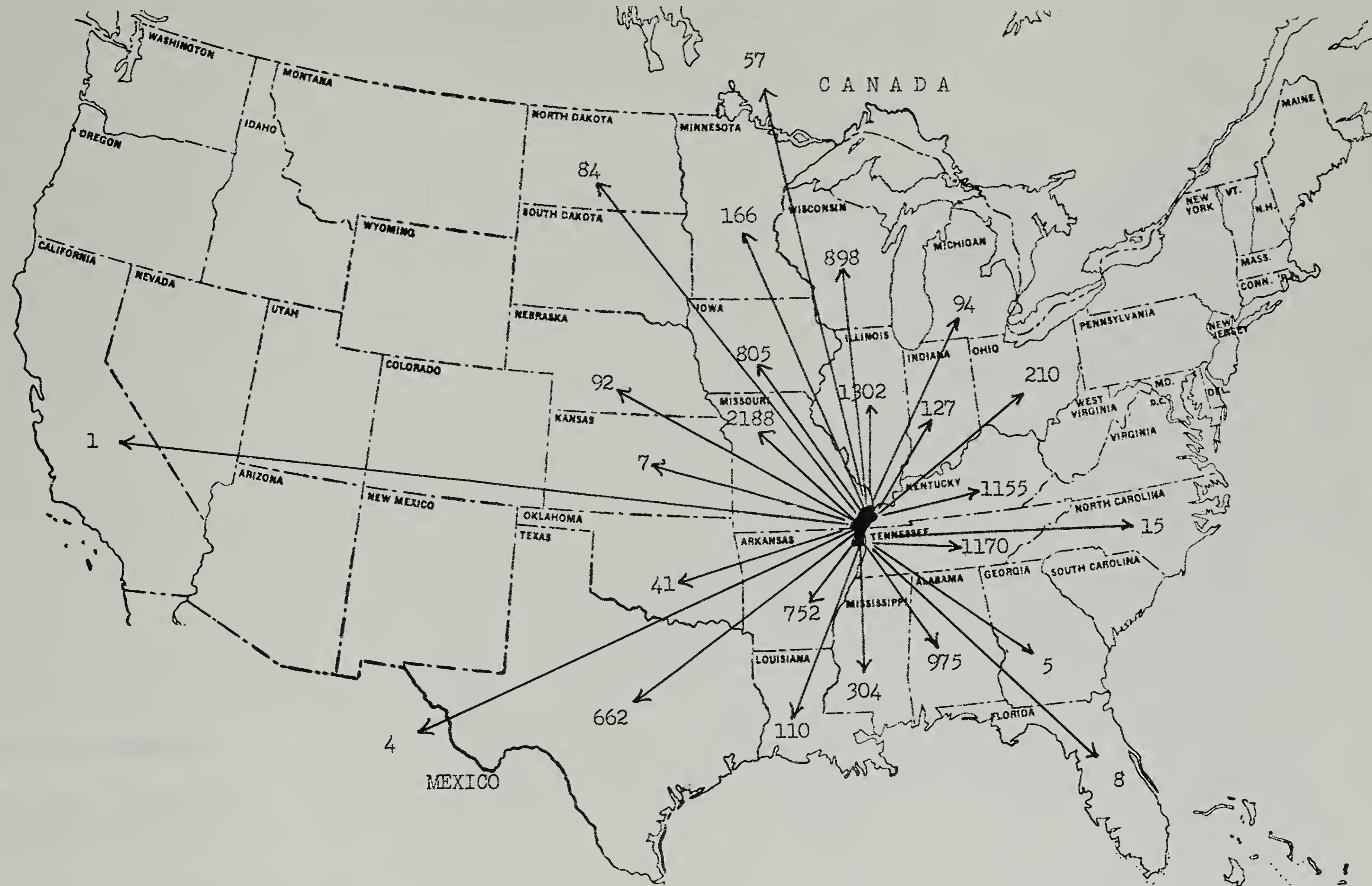
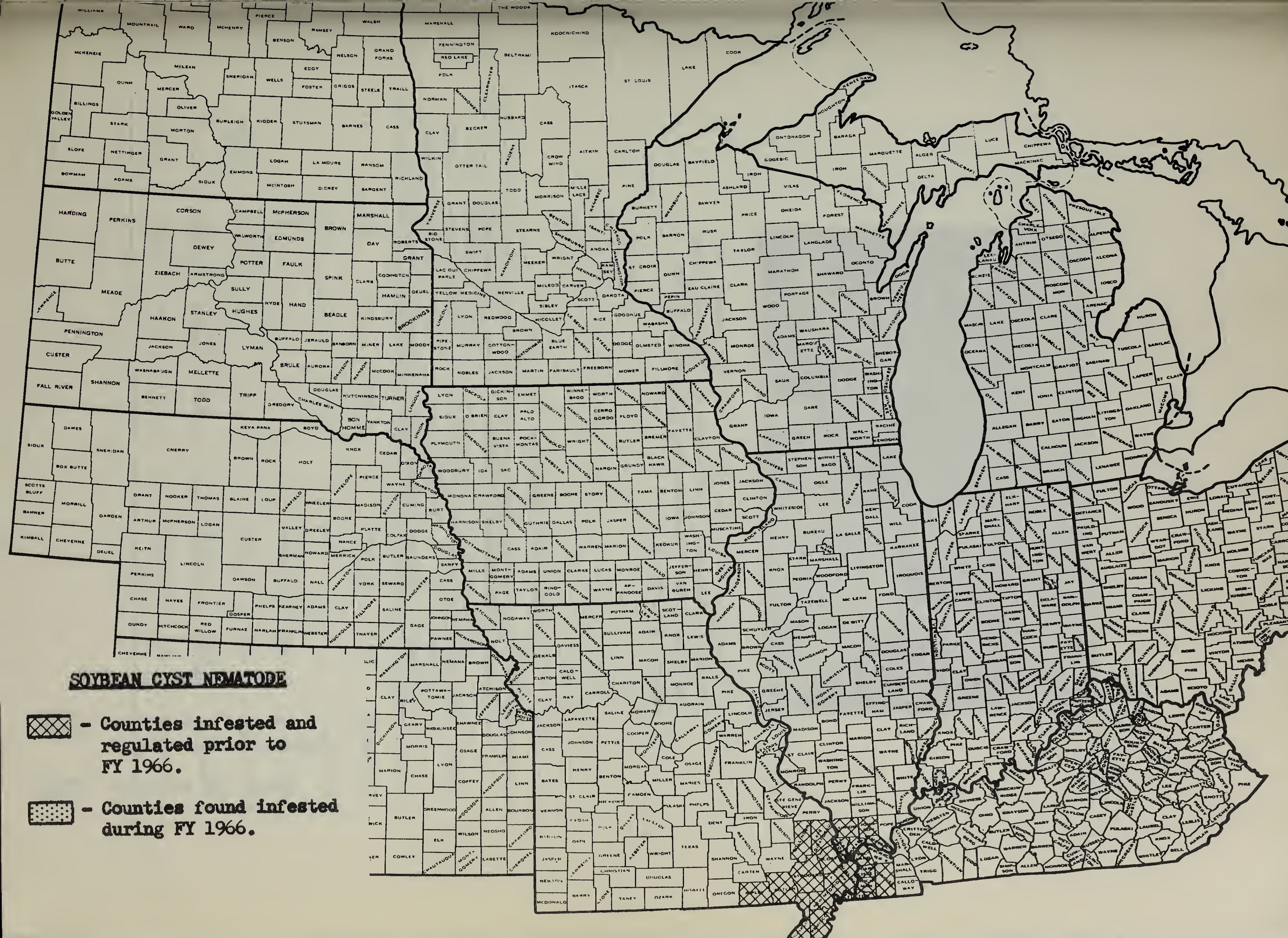


Figure indicates total number of items (construction equipment, tractors, cultivators, plows, combines, harrows, etc.) certified.

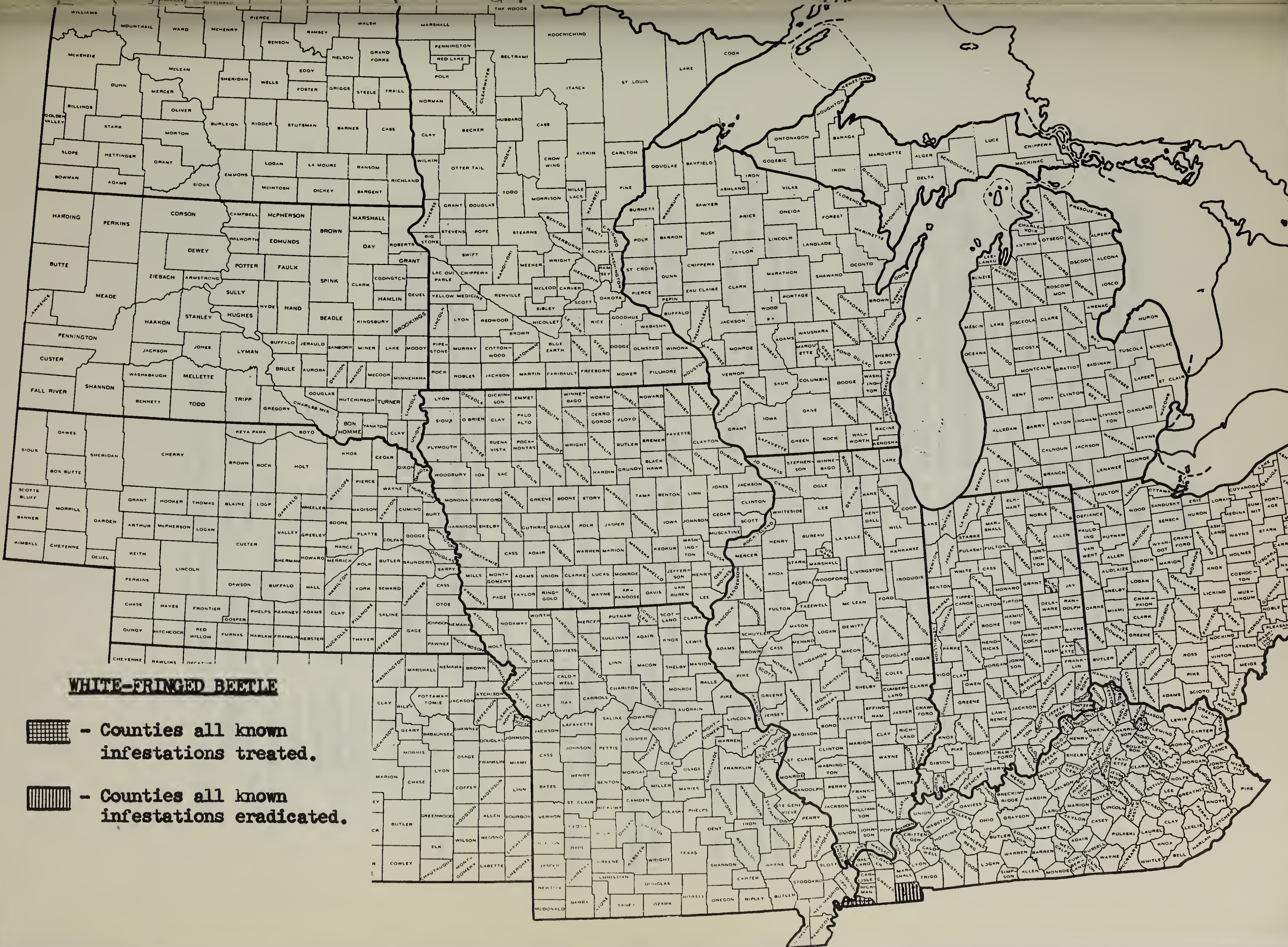
Total items certified - 11,232 (Hale Auction - 9,383, Brewer Auction - 873, others - 976).
Treatments - 4,531 items washed, 296 items fumigated, 6405 from non-regulated territory - mostly via auctions.


SOYBEAN CYST NEMATODE
- Counties infested and regulated prior to FY 1966.
- Counties found infested during FY 1966.

The sales lot of the Hale Auction Company at Sikeston, Missouri, and some of the used farm machinery and construction equipment being moved through it.

Soybean Cyst Nematode - FY 1966

State	Survey and Detection: Surveyed: Properties	Survey and Detection: Surveyed: Acres	Survey and Detection: Infested: Properties	Survey and Detection: Infested: Acres	Regulatory: Properties Inspected	Regulatory: Commod. Treatments (Visits)	Regulatory: Soil Treatment (Cu. Ft.)
Illinois	584	85,584	1	365	75	42	0
Indiana	0	0	0	0	1	0	0
Iowa	2,243	35,266	0	0	0	8	0
Kentucky	267	20,282	1	15	32	741	2,286
Missouri	1,064	47,608	12	870	3,550	366	0
Totals	4,158	188,740	14	1,250	3,658	1,157	2,286


WHITE-FRINGED BEETLE
- Counties all known infestations treated.
- Counties all known infestations eradicated.

WHITE-FRINGED BEETLE

The white-fringed beetle was first reported in the spring of 1936 in Florida in a field of peanuts being damaged by the beetle in the larval stage. The following year it was found at several localities in Louisiana and Mississippi. Since then, the pest has been found in parts of Alabama, Arkansas, Florida, Georgia, Kentucky, Mississippi, New Jersey, North Carolina, South Carolina, Tennessee, Virginia, and Maryland.

In the fall of 1960, the first beetle found in the Central Region was collected near a railroad right-of-way in Fulton, Kentucky. A 15-acre area was treated around the single beetle find. In 1962 a small infestation was found in Hazel, Galloway County, Kentucky, and in 1963 another was located in Murray in the same county, about 8 miles north of Hazel. These two infestations involved the treatment of only 31 acres.

In 1965, a small established infestation was discovered in the village of Hickman, Fulton County, Kentucky. Using 10-percent granular dieldrin, 501 acres were treated by plane and ground equipment. This control was accomplished by equal participation with State cooperators.

To date no economic damage has been reported, and the infestations are being cooperatively treated as they are found. This precludes any Federal quarantine requirements at this time.

Planned intensive surveys will be continued in the southern sections of Illinois, Kentucky, and Missouri each year.

White-fringed Beetle - FY 1966

State	Survey & Detection Acres		Control	Regulatory
	Surveyed	Infested	Acres Treated	Properties Inspected
Illinois	447	0	0	0
Indiana	130	0	0	0
Kentucky	12,330	468	501	0
Missouri	7,760	0	0	0
Ohio	0	0	0	2
Totals	20,667	468	501	2

WITCHWEED

Detection surveys for this parasitic plant pest have been conducted by Plant Pest Control personnel in the Central Region since it was first discovered on the Atlantic Coast. Such surveys, made in conjunction with other program activities, have all been negative.

This past season, surveys were again made in various areas as Plant Pest Control personnel worked on other program assignments. This was especially true in Iowa and Missouri.

Witchweed - FY 1966

State	Survey & Detection Properties		Regulatory
	Surveyed	Infested	Properties Inspected
Iowa	430	0	0
Missouri	230	0	0
Totals	660	0	0

DETERMINATION OF IMPACT OF AGRICULTURAL PESTICIDES ON THE ENVIRONMENT

The Central Region monitoring program is now in its second full season of operation. Sampling was carried on at two sites in the Red River Valley--one in Minnesota and the other in North Dakota. Station headquarters were established at Grand Forks, North Dakota. Work on the Minnesota area was suspended in the spring of 1966.

Mr. W. J. Brandvik, who was in charge of the field office located at Grand Forks, North Dakota, resigned and was replaced by Mr. C. F. Ketner.

The work accomplished in the one-square-mile study area will develop information on pesticide levels in soil, water, sediment, food, and feed crops. Indicator species of various insects, aquatics, and small mammals were observed or collected to support the data developed from other sampling procedures.

Special study areas were set up at 11 other locations in the Region. These included high-use, low-use, and non-use areas.

High-use areas were in orchard or crop areas where annual use of persistent pesticides occurs. Sampling sites were also established in Michigan, Illinois, and Iowa.

Low-use areas have had only one or two applications of persistent pesticides in 10 years. Three of the sites selected were in national forests in Michigan, Minnesota, and Wisconsin, and the fourth in a valley treated for Japanese beetle in Kentucky.

The four non-use study areas had no record of pesticide usage during the last 10 years. These were located in wildlife refuges in Nebraska and Michigan, a grassland area in South Dakota, and a national forest in Missouri.

Federal and State agencies or private individuals cooperated at all sampling sites to develop the necessary background information on pesticide usage.

Soil samples from national forests were collected by Forest Service personnel. Plant Pest Control employees collected the samples from all other sources. All samples were screened and sent to the Grand Forks Station for extraction.

Total Samples Collected - FY 1966

State	Number of Samples Collected, Fiscal Year 1966				
	DIAP	High-Use	Low-Use	Non-Use	Total
Illinois	0	50	0	0	50
Iowa	0	45	0	0	45
Kentucky	0	0	10	0	10
Michigan	0	50	10	10	70
Minnesota	318	0	10	0	328
Missouri	0	0	0	10	10
Nebraska	0	0	0	10	10
N. Dakota	304	0	0	0	304
S. Dakota	0	0	0	10	10
Wisconsin	0	0	10	0	10
Totals	622	145	40	40	847

The chemist at the Grand Forks Station extracted any pesticides that might be found in a given sample. These extracts were then sent to the Gulfport, Mississippi, Laboratory for analysis.

SAFETY AND PROGRAM MONITORING

During fiscal year 1966, it was the practice of the Plant Pest Control Division to "do the job - but do it safely." Each employee was coached and encouraged to give safety of performance a high priority in the execution of his duties. To accomplish this, safety information and reminders were continually made available by the Regional Office through the medium of bulletins, posters, flyers, films, and memoranda. It has been a requirement of supervision to make safety a subject of discussion at each opportunity, whether during field visits or at regularly scheduled meetings. Checks for safe operating practices were regularly made at offices, storerooms, and other establishments, and of vehicle operation and control programs.

Monitoring of control programs for the effect on non-target organisms and the total environment has been continued where and when required. For instance, close and careful checks were made of malathion applications for cereal leaf beetle control for the effect on bees. Inspectors of the Illinois, Indiana, and Michigan Departments of Agriculture cooperated in this work.

The safety feature was built into control programs through a safety section in the work plan. Practices to be followed were carefully spelled out in adequate detail to assure safe operations. Care was taken to see that all empty insecticide containers were disposed of by an approved method.

ASSOCIATED ACTIVITIES

Associated activities in connection with the various Plant Pest Control programs have been many and varied. In the early years of the barberry eradication work, for example, supervisors visited rural schools to give talks and distribute the informational material about barberry bushes and stem rust. With the assistance of cooperators, they formed "Rust Buster" clubs and awarded medals to youngsters for locating and reporting barberry bushes. Public meetings, exhibits, bulletins, newspapers, and films have long been a means of dispensing information. To this list, in more recent years, can be added radio and television. Supervisors now make use of all of these in keeping the public informed of program activities.

Informing the public of Plant Pest Control activities continued to be an important part of the supervisor's work. The general public, agricultural groups, industry, other interested parties, and cooperators were kept informed of the progress, accomplishments, and status of program activities.

Supervisors assisted with newspaper items, radio tapes, television interviews, and feature articles. Many of them were called upon to speak before garden clubs, school classes, university seminars, and other similar groups. In addition, they have supplied program aids, slide series, films, and photos as requested. Various universities and colleges in the Region have made use of Plant Pest Control films stocked in their film libraries.

Many exhibits have been prepared by supervisors for use at State and county fairs, flower shows, agricultural meetings, and other events of a similar nature.

Summary of Associated Activities, by States, in Central Region - Fiscal Year 1966

State	Public Meetings Attended	Presentations					Feature & News Stories	Extent These Aids Were Used				Special Reports	Man Hrs. Tech. Asst.
		Talks	Slides	Films	Radio	TV		Exhibits	Bulletins	Circulars	Infes. Maps & Posters		
Illinois	-	1	1	2	-	-	1	1	1,098	139	260	-	-
Indiana	1	-	-	-	-	-	-	-	19	242	2,218	-	-
Iowa	1	7	4	-	1	1	3	-	-	6,031	84	2	-
Kansas	-	-	-	-	-	-	-	1	186	-	140	-	-
Kentucky	-	-	-	-	4	1	5	3	2,600	2,700	220	-	-
Michigan	5	6	-	10	3	2	12	-	2,165	20,878	1,048	9	-
Minnesota	-	-	-	9	1	-	-	2	85	-	125	22	-
Missouri	4	4	9	-	-	-	-	5	-	26,431	279	2,001	2
Nebraska	-	-	-	-	-	-	-	-	186	900	140	-	-
N. Dakota	3	-	-	-	-	-	-	-	695	1,170	1,435	-	-
Ohio	2	6	=	-	1	-	-	-	5,600	2,900	305	-	16
S. Dakota	7	4	3	3	-	-	-	2	1,685	2,385	772	1	50
Wisconsin	-	-	-	1	-	-	-	-	-	143	-	24	-
Totals	23	28	17	25	10	4	21	14	14,319	63,919	7,026	2,059	68

Summary of Associated Activities, by Programs, in Central Region - Fiscal Year 1966

Program	Public Meetings Attended	Presentations					Feature & News Stories	Extent These Aids Were Used				Special Reports	Man Hrs. Tech. Asst.
		Talks	Slides	Films	Radio	TV		Ex-hibits	Bul-letins	Circu-lars	Infes.Maps & Posters		
BE	-	4	4	10	1	-	6	2	1,624	8,445	185	46	-
CLB	7	12	-	-	8	1	7	2	7,396	1,184	3,559	-	16
EC	-	-	-	-	-	-	-	-	-	1,020	2	-	-
GC	10	4	3	3	-	-	-	3	2,380	3,655	2,446	1	50
GM	-	-	-	5	-	-	-	-	6	9	-	-	-
ID	-	-	-	-	-	-	-	-	410	450	3	-	-
IFA	-	-	-	-	-	-	-	-	-	50	14	-	-
JB	1	1	-	6	1	3	7	2	1,594	38,342	417	11	-
KB	-	1	-	1	-	-	-	1	32	703	-	-	-
PBW	-	-	-	-	-	-	-	-	-	2,000	-	2,000	-
SCN	5	6	10	-	-	-	1	2	73	2,371	380	1	2
WFB	-	-	-	-	-	-	-	2	802	5,600	10	-	-
WW	-	-	-	-	-	-	-	-	2	90	10	-	-
Totals	23	28	17	25	10	4	21	14	14,319	63,919	7,026	2,059	68

PART III

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P L A N T   P E S T   C O N T R O L   D I V I S I O N

COOPERATIVE PROGRAMS

EASTERN REGION

FISCAL YEAR

1966

December 1966
Moorestown, New Jersey

U. S. Department of Agriculture
Agricultural Research Service
Plant Pest Control Division

EASTERN PLANT PEST CONTROL REGION

REGIONAL STAFF
Moorestown, New Jersey

PROGRAM DEVELOPMENT & SERVICES STAFF

- Survey & Detection
- Regulatory Operations
- Control Operations
- Methods Improvement

ADMINISTRATIVE OFFICE

STATE OFFICES

Maine, New Hampshire, Vermont
Concord, N. H.

Massachusetts, Rhode Island, Connecticut
Waltham, Mass.

New York
Albany, N. Y.

Pennsylvania
University Park, Pa.

New Jersey
Trenton, N. J.

Maryland, Delaware, District of Columbia
Beltsville, Md.

Virginia, West Virginia
Roanoke, Va.

LABORATORIES

Hicksville, N. Y.
Otis AFB, Falmouth, Mass.
Franklin, Va.

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BARBERRY ERADICATION

Fiscal Year 1966

The barberry eradication program was continued in cooperation with the states of Pennsylvania, Virginia, and West Virginia. Rework requirements were emphasized. In addition, some initial work was scheduled and accomplished in all three States. A total of 3,693,605 rust spreading barberry bushes was destroyed on 847 old properties and 161 new properties. Also, 366 properties were relegated to the inactive status and 604 square miles were placed under maintenance.

As a result of examination of barberry, mahoberberis, and mahonia, in growing plots of nurseries, and arrangements made with dealers, 224 establishments were authorized to move such plants interstate. Included in this total are two seed growers. Regulatory activities also included inspection of barberry plants in postentry status, and applications from nurseries to receive one year old seedlings.

Evaluations of work programs and procedures were made in all three States in the interest of determining that the most practicable current approaches are being followed.

BARBERRY ERADICATION
Fiscal Year 1966

State	SURVEY AND DETECTION			CONTROL	REGULATORY	
	Sq. Mil. Surveyed	Properties Reinspected	No. Properties Found With Bushes	Plants Destroyed	Nurseries Inspected	Other Properties Inspected
Conn.					23	
Del.					13	
Md.					35	
Mass.					17	
N. J.					58	2
N. Y.					53	4
Penna.	1215	1739	597	14644	51	7
R. I.					9	
Va.	60	210	152	1699820	55	
W. Va.	82	314	259	1979141	21	
Total	1357	2263	1008	3693605	335	13

BROWN-TAIL MOTH

Fiscal Year 1966

State-Federal scouting surveys were conducted in six states: Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, and Vermont. In four states--Connecticut, Rhode Island, Vermont, and Maine--results were negative. In Massachusetts known established infestations at Dennis, Sandy Neck, and the Provincetown-Truro area in Barnstable County were delimited. No new infestations were found in that State. In New Hampshire scattered infestations were located in four counties: Hillsboro, Merrimack, Belknap, and Carroll.

Control activities in New Hampshire involved the cutting of webs during the winter months. Personnel of this Division and the New Hampshire Department of Agriculture cut and destroyed a total of 3,031 winter webs at 12 sites in 9 towns.

Approximately 440 acres were sprayed for brown-tail moth control on Cape Cod National Seashore Park lands in the Provincetown-Truro area of Massachusetts. In this operation Park personnel applied Sevin by mist blower and hydraulic sprayer. Technical assistance was provided by PPC. In a separate operation, the town of Dennis, on Cape Cod, furnished funds for handclipping webs on a 250 acre known infested area.

Quarantine #45 was revised on July 16, 1965, separating brown-tail moth regulated areas from gypsy moth regulated areas. This revision restricted the brown-tail moth regulated area to localities actually infested with this pest or threatened by it.

CEREAL LEAF BEETLE

Fiscal Year 1966

In view of the continuing spread of cereal leaf beetle, *Oulema melanopa* (*L*.), in the Central states, observations and sweepings were made at selected sites throughout the Eastern Region. Areas which had received host products were given first consideration in site selection. Intensive survey operations were conducted by crews operating in those counties of Pennsylvania and West Virginia which border on Ohio. In this operation 2,486 properties were checked in 12 counties in West Virginia and 2,719 properties in ten counties in Pennsylvania.

In the regulatory phases of the work, shipments arriving from the quarantined states were checked for certification.

COOPERATIVE ECONOMIC INSECT SURVEY

Fiscal Year 1966

Close working relations were maintained with survey coordinators in all states. In the Virginia-West Virginia area a special workshop was held to encourage greater participation in cooperative insect detection surveys. In addition, a special short course, "Recognition of Common Insects," was conducted at Rutgers University. This was a cooperative service provided by the University and the course was geared to meet Division needs. The session was attended by 20 Divisional employees as well as four employees from the Plant Industry Division of the New Jersey Department of Agriculture. During February, seven Divisional inspectors were qualified for primary identification assignments. Primary identifiers determine program insects in the field thus reducing the load on Federal taxonomists.

In order to be on the alert for insect introductions 29 black-light traps were operated at 43 locations at major ports of entry. After the screening of collected materials, specimens were sent to cooperating state and university entomologists for further identification. Specimens which required special taxonomic attention were forwarded to the Insect Identification Section, Washington, D. C. In several states fruit fly traps were also used in port of entry detection efforts. Sticky-board traps were most generally used but in certain areas the conventional McPhail and Steiner traps were also utilized. No new species were encountered.

As a result of the discovery of pear sawfly, Hoplocampa brevis (Klug), at Queenston, Ontario, Canada, in 1964, a survey for its prevalence was undertaken in 1966 by personnel of this Division and cooperating state agencies. Positive findings were encountered in New York, Pennsylvania, Connecticut, and Rhode Island.

In consideration of the presence of winter moth, Operophtera brumata, in Nova Scotia and New Brunswick, Canada, survey operations were again conducted in the coastal areas of Maine from Ellsworth to Calais. Twenty-two battery operated black-light traps were utilized. The procedure of banding trees adjacent to the traps with tanglefoot was again followed. No evidence of infestation was encountered.

Observations to determine the spread of the weevil Pachytychius Haematocephalus were again conducted by inspectors of the cooperating State agency in New York. It appears that this pest is now prevalent in Albany, Schenectady, Rensselaer, and Columbia Counties. No reports of damage were received from the involved areas.

In New Jersey continued checks were made for the scarabaeid beetle Anomala ausonia et., first found during the summer of 1964. No positive findings were encountered.

COOPERATIVE ECONOMIC INSECT SURVEY (cont'd)

Laboratory processing of field and grader soil samples in Rhode Island resulted in the finding of specimens of wheat cyst nematode, Heterodera punctata. This was a new State record. The samples were collected during golden nematode survey operations.

Fiscal Year 1966

During the summer of 1965, survey operations were conducted in all States within the Eastern Region except Virginia. Chemical and black-light traps were used extensively; visual observations were made primarily in delimiting operations.

Survey results in Capon Bridge and other sections of West Virginia were again negative. Positive findings were made in the states of Connecticut, New Jersey, New York, and Pennsylvania. In Connecticut no new county or town records were established; however, extensions of known infestations were encountered in Meriden, New Haven County and Berlin, Hartford County. In New Jersey positive sites were again encountered in Essex and Hudson Counties. Survey in Pennsylvania proved negative outside the known infested county of Erie where outlying infestations were encountered at Lake City and in Northeast Township. The Erie city infestation was also extended. In New York, new county records were established in Livingston and Westchester Counties. Extensions of previously determined infestations were recorded in [redacted] Broome, Cayuga, Erie, Oneida, Onondaga, Ontario, Oswego, and Schuyler Counties. Although no actual infestation has been recorded in Chautauqua County, New York, 160 acres in that County have been recorded as infested due to the proximity of infestation at the Pennsylvania State line.

Control treatments were applied at two sites totalling 55 acres in Hudson County, New Jersey, during this period.

In Pennsylvania granular insecticides were applied by helicopter, turbine blower, and hand-operated seedcasters to a total of 8,810 gross acres. The area treated included one large block nearly ten miles long and one-to-two miles wide extending through downtown Erie east to rural sections of Harborcreek Township and three separate blocks, each about one mile square--one in Lake City, another in Traceydale on the western edge of the city of Erie, and a third in Northeast Township situated astride the New York-Pennsylvania border. The latter included 90 acres in Chautauqua County, New York. Dieldrin was used wherever possible and granular chlordane was applied on gardens and other sensitive areas.

Regulatory services were provided throughout the year. Residual treatment was applied on 111 acres of turf at Hancock Airport, Syracuse, New York, late in September 1965 by airport personnel. State and Federal cooperators provided technical assistance and equipment.

EUROPEAN CHAFER
Fiscal Year 1966

State	SURVEY AND DETECTION		CONTROL	REGULATORY	
	Sites Trapped	Acres Infested	Acres Treated	Nurseries Properties Inspected	Other Properties Inspected
Conn.	72	1237		28	27
Del.	19				
D. C.	2				
Me.	40				
Md.	41				
Mass.	277				
N. H.	15				
N. J.	582	1575	55		
N. Y.	3224	15740	90	774	108
Pa.	1774	3640	8810		
R. I.	8				
Vt.	80				
W. Va.	70				
Total	6204	22192	8955	802	135

GOLDEN NEMATODE

Fiscal Year 1966

During the year intensive survey operations were conducted in the principal potato producing areas of Long Island. This work revealed positive findings in ten fields not previously found infested, aggregating approximately 380 acres.

Outside Long Island, surveys were conducted at field sites and grader stations in the states of Maine, Maryland, Massachusetts, New Jersey, New York, and Rhode Island. All results were negative.

During the summer of 1965, fumigation treatments were applied on 12 properties totalling 381 acres in Nassau and Suffolk Counties, New York. The state of New York continued its compensation program as a means of withholding known infested lands from potato production. This provision continues to be of assistance and at the completion of this year's treating program all active potato land known to be infested had been fumigated.

The Division continued to cooperate with the New York Department of Agriculture and Markets in the enforcement of State quarantine regulations. Potato growers and others directly affected extended noteworthy cooperation.

GOLDEN NEMATODE
Fiscal Year 1966

State	SURVEY AND DETECTION				CONTROL	REGULATORY
	Inspected		Infested		Acres Fumigated	Potato Grading Station Inspections
	Properties	Acres	Properties	Acres		
Me.	695	21100				
Md.	1					
Mass.	156	3523				
N. J.	107	4330				
N. Y.	1513	48642	10	382	381	1723
R. I.	79	1521				
Total	2551	79116	10	382	381	1723

GYPSY MOTH

Fiscal Year 1966

Survey was conducted in all states within the Region except those known to be generally infested. In all, 51,306 traps were utilized for detection or delimiting purposes during the summer months. Traps were charged with synthetic natural sex attractant material and were rebaited with precharged wicks of the same material at mid-season.

Trapping and scouting surveys revealed infestations within the suppressive area and at several locations in non-regulated sections of New York, New Jersey, Pennsylvania, and Vermont. Of particular note in New York was the finding of infestation at sites outside the regulated area in Jefferson, Broome, Madison, and Franklin Counties. Within the suppressive area positive findings were encountered in Orange, Sullivan, Onedia, and Otsego Counties. In northeastern Pennsylvania, in contrast to the three positive trap sites encountered in the 1964 survey, a total of 18 sites were found in Wayne, Pike, Monroe, Northampton, Bucks, and Luzerne Counties. Of note in the New Jersey survey were positive findings encountered in Burlington, Ocean, Monmouth, and Camden Counties. Numerous trap finds were encountered in the northern sectors of the State.

In the non-regulated area of Vermont, positive trap sites were encountered in Franklin, Essex, and Lamoille Counties.

Under the cooperative Federal-State gypsy moth control program, a total of 95,411 acres was treated in Pennsylvania, New Jersey, and New York. Included were all known infestations in Pennsylvania, and peripheral areas of infestation in New Jersey and New York. The majority of the 42 spray blocks in New York were within the suppressive area. Sevin was used exclusively in a water-base formulation at the rate of one pound per gallon per acre.

State and local agencies in Connecticut, Massachusetts, New Jersey, New York, and Rhode Island treated 215,521 acres within the generally infested area to suppress heavy moth populations and prevent defoliation.

Aerial defoliation surveys were conducted in New Jersey, Connecticut, Vermont, New Hampshire, Maine, New York, Massachusetts, and Rhode Island. The amount of defoliation recorded this year, 51,865 acres, is the lowest recorded since 1960. A small area of defoliation was observed in Morris County, New Jersey,--the first defoliation recorded in that State since the early 1920's.

Regulatory services provided throughout the year involved inspections at processing, industrial, and shipping sites, as well as field inspections of nurseries and other premises. Nursery establishments applied control treatments to growing plots and borders to maintain certification status.

GYPSY MOTH (cont'd)

During fiscal year 1966, 327 establishments and dealers were approved to move mined, manufactured, or quarried stone and quarry products without certification. Special exemption from certificate usage granted to certain timber shippers who move products to Canada, which was initiated May 19, 1960, remained in effect.

The Federal gypsy moth regulated area and quarantine regulations were revised effective July 16, 1965. Added to the generally infested area were the following previously non-regulated localities: New Jersey - Morris County and parts of Bergen, Essex, Passaic, Somerset, Sussex, and Union Counties; New York - town of Chateaugay in Franklin County and towns of Indian Lake and Lake Pleasant in Hamilton County; and Vermont - town of Cambridge in Lamoille County. Counties and towns transferred from the suppressive area to the generally infested area category in New York included all of Nassau and Westchester Counties, 18 towns and 2 cities in Orange County, and 5 towns in Sullivan County.

GYPSY MOTH
Fiscal Year 1966

State	SURVEY AND DETECTION		CONTROL		REGULATORY		
	Sites		Acres Treated		Properties Inspected		Acres Foliage Treated
	Trapped	Positive	Chemical	Saturation Trapping	Nursery	Other	
Conn.					761	174	797
Del.	53					55	
D. C.	3					35	
Me.	2243				46	1753	
Md.	340				17	281	
Mass.					485	1013	40
N. H.					22	727	
N. J.	7881	59	23062	14886	1039	330	90
N. Y.	20941	67	42365		775	5418	9
Penna.	16501	18	29984		14	123	
R. I.					109	102	
Vt.	1823	3			54	1669	
Va.	1021				3	174	
W. Va.	500				1	74	
Total	51306	147	95411	14886	3326	11928	936

JAPANESE BEETLE

Fiscal Year 1966

An extensive trapping survey conducted in non-regulated sections of Maine between July 8 and September 1, 1965 failed to reveal new infestation. In the survey 795 Japanese beetle traps were placed at sites in nine counties. Survey was limited to Maine as the remainder of this Region is under regulation.

Throughout the year regulatory services were provided to establishments and individuals concerned with the movement of plants, soil, and other regulated products.

Seasonal restrictions were effected during the adult flight period in several southwestern Virginia counties. Produce, with an estimated value of almost $120,600, was certified for movement from that area on the basis of field scouting or fumigation. The state of Virginia discontinued roadside foliage spraying this year; however, several growers applied Sevin to crops in order to reduce beetle populations and damage.

Although no airports in the Eastern Region were declared hazardous during the adult flight season, Ohio airports so designated made necessary the treating of planes departing from three airports in this Region. Under established procedures all planes stopping at infested fields enroute to non-regulated areas must be treated at flight origin.

Control treatments were unnecessary in the non-regulated section of this Region. Divisional personnel assisted at military and civilian airports where control measures of a continuing or progressive nature are in effect. Residual soil treatments were applied voluntarily by principal military and commercial airfield operators. The state of Rhode Island applied 50 pounds of milky spore disease in a Japanese beetle control program throughout the State. The latter involved 48 locations in 14 towns.

A total of ten colonies of the Japanese beetle parasite Tiphia vernalis was collected in West Virginia, six of which were then released in southwestern Virginia. The remaining four colonies were forwarded for release in Georgia, Illinois, North Carolina, and Ohio.

JAPANESE BEETLE
Fiscal Year 1966

State	SURVEY AND DETECTION		CONTROL		REGULATORY			
	Sites	Acres	Chemical	Biological	Properties Inspected		Acres Treated	
	Trapped	Infested	Acres	No. Parasites Released	Nursery	Other	Soil	Foliage
Conn.					594	65	648	
Del.					362	136	476	
D. C.					1	34		
Me.	795				173	80		
Md.					871	881	164	
Mass.					434	639	6	
N. H.					67	117		
N. J.					1965	234	833	2575
N. Y.					1396	285	128	
Penna.					1013	392	54	
R. I.					161	1	144	
Vt.					144	31		
Va.					391	1142	626	
W. Va.					143	83		1350
Total	795				7715	4120	3079	3925

KHAPRA BEETLE

Fiscal Year 1966

Survey for khapra beetle in the Eastern Region was conducted on a selective basis. Emphasis was placed on checking sites or distributors involved in the storage or movement of commodities originating in suspect areas or conveyances. Related inspections were made of grain and feed storehouses, bagging companies, hide importers and railroad cars which had transported exposed material. Properties inspected in the states of Delaware, Maryland, New Jersey, New York, Pennsylvania, and Virginia totalled 235. Although numerous specimens were collected and submitted for identification, all proved negative.

Appropriate regulatory action was taken in four instances wherein exposed materials or carriers moved beyond port areas. Information was provided by the Plant Quarantine Division and the action was initiated by PPC personnel, working in close cooperation with officials of the involved State regulatory agencies.

KHAPRA BEETLE
Fiscal Year 1966

State	SURVEY AND DETECTION		CONTROL	REGULATORY			
	Properties		Fumigated	Properties	Commodity Treatments	Pesticide Treatments	
	Surveyed	Positive	Cubic Feet	Inspected	No. Visits	Sq. Ft.	Cu. Ft.
Del.	32						
Md.	54						
N. J.	86						
N. Y.	4						2560
Penna.	58			11	3	225	
Va.	1						
Total	235			11	3	225	2560

METHODS IMPROVEMENT

Fiscal Year 1966

BARBERRY ERADICATION:

A new series of herbicide tests were applied to barberry bushes in test plots in Pennsylvania and Virginia. These tests were conducted to further evaluate the most promising herbicides and to develop improved methods of application. At Otis AFB, modifications were made in the analytical method for herbicide esters of 2,4 D and 2,4,5 T. These modified methods will permit better reproducibility of analysis.

BROWN-TAIL MOTH:

In cooperation with Methods Improvement personnel a heavy infestation at Henniker, New Hampshire covering 50 acres and an estimated 8,000 winter webs was sprayed by Division aircraft with Shell insecticide SD-8447. Mortality was estimated at 75 percent.

EUROPEAN CHAFER:

Chemical traps made of plastic sheeting were used for the first time under field conditions. The traps proved satisfactory and are currently being considered for volume usage. These traps are a low cost item and will be disposable.

An analysis of stored N-butyl sorbate revealed that deterioration had occurred. Prior to distribution to the field for use in European chafer survey traps the material was sent to the manufacturer for reprocessing. As a result of this development, it has been recommended that in the future all material be analyzed prior to use.

Laboratory tests were conducted with new and promising insecticides. The objective of these tests was to collect data useful in selecting non-chlorinated hydrocarbons for further evaluation against chafer larvae. Results of the investigation indicated that Diazinon, Durban, N-2790, Hoechst 2911, and Bayer 77488 are promising materials which warrant further testing. This work was conducted by personnel of the Entomology Research Division's experimental station at Geneva, New York in cooperation with Dr. F. L. Gambrell.

GOLDEN NEMATODE:

In the treating of soil with fumigants for nematode control, it is essential to have accurate soil moisture readings. To obtain these readings, work is under way to set up a table of data applicable for use with an "aquaprobe" soil moisture indicator.

Investigations were continued to devise a method of larval viability determination through the use of electrical stimulation.

GOLDEN NEMATODE (cont'd)

Nematocide screening tests using carbon impregnated methyl bromide granules were conducted at the Nematode Research Laboratory, Farmingdale, New York. Results to date have been inconclusive. Tests with sodium and potassium azides appeared to show some promise. This material killed the golden nematode larvae both inside and outside the cyst. However, the metal azides are quite explosive and must be used with considerable caution.

GYPSY MOTH:

Radiological Sterilization

Pupae of approximately the same biological age are required for radiological sterilization. Refrigeration tests were initiated in an attempt to slow down metabolism, thereby guaranteeing uniformity in development.

To determine optimum radiation dosage for successful sterilization, male pupae were irradiated at the U. S. Fish and Wildlife Service radiation laboratory in Gloucester, Massachusetts. Dosage levels ranged from 20,000 to 30,000 roentgens. Approximately 20% mortality occurred at the 30,000 roentgen level. Very little difference was observed in the effects of radiation on insects reared on foliage and those reared on an artificial diet.

Chemosterilants

Nineteen candidate chemosterilant materials were screened against the gypsy moth. Hexamethyl melamine hydrochloride (ENT 50905) provided 99.9% sterilization at 40 mg per one gallon bottle.

A column chromatographic clean-up method was developed to obtain accurate tepa values of less than 20 ug/insect. This method permits analysis to be performed on insects containing 0.5 ug tepa per insect, and if necessary, may be scaled down to the 0.1 ug level.

A bottle-rolling treating device was fabricated which allows even applications of tepa residues to be applied to the inner surface of one gallon bottles. The film is deposited in the rotating bottles by pressurizing a tepa solution through a needle and manually drawing the needle at a predetermined rate from one end of the bottle to another. Adult male gypsy moths can be successfully sterilized when introduced into these bottles and exposed to a tepa residue film of 9.5 ug per square foot, for a period of eight hours. Sterilized moths are fully competitive with normal male moths under field conditions. In tests using aerosols for sterilization of male moths, 90% non embryonation was obtained by a 25 minute exposure to a fog generated from a 10% aqueous tepa.

METHODS IMPROVEMENT (cont'd)

GYPSY MOTH (cont'd)

A field laboratory was established at Colchester, Vermont in preparation of more extensive chemosterilant tests on three islands in Lake Champlain. In preparation for controlled sterile male releases each island was treated with one pound actual Sevin per acre to eliminate indigenous gypsy moth populations.

Insecticidal Investigations

A simple laboratory sprayer was devised for ultra low volume insecticide applications to surfaces such as potted oak seedlings. With this sprayer reproducible results can be obtained and droplet size readily controlled.

DDT dosage-mortality tests provided LD 50 and LD 95 levels of .03 and .05 pounds per acre using second instar larval. DDT at these levels is to be included as a standard in future screening tests.

In laboratory tests a four pound per gallon ULV formulation of carbaryl (Sevin 4-oil dispersion) provided effective control and showed good weathering characteristics. Encouraging results were also obtained with ULV formulations of SD-8447 and trichlorfon and a one gallon per acre water formulation of Bromophos. These insecticides were aerially field tested in 16 experimental spray plots near East Lyme, Connecticut. A rapid check of higher dosage plots of trichlorfon and SD-8447 indicated good control and poor results with Bromophos.

Near Holland, Massachusetts 400 acres were treated with one pound actual Sevin plus sticker per quart per acre. This formulation was prepared by adding seven pounds of Sevin 80S to one gallon of water plus four ounces of UCAR 680 sticker. The formulation clogged the aircraft spray system and failed to satisfactorily adhere to the foliage.

Parasites and Predators

In a field insectary located at Naugatuck, Connecticut 9,493,000 Ooencyrtus kuwanai, an egg parasite, were reared for release in New York, New Jersey, and Pennsylvania. Puparia of 96,000 Sturmia scutellata collected at the insectary were overwintered at the Otis laboratory and released in the spring in New York and New Jersey. Small numbers of a predatory beetle, Calosoma sycophanta, were released in Jefferson County, New York and Pike County, Pennsylvania. Four thousand Apanteles melanoscelus cocoons were collected and placed in storage in gelatin capsules for spring propagation. Twenty-four hundred gypsy moth larvae were parasitized individually by Apanteles in order to strengthen testing colonies.

GYPSY MOTH (cont'd)

Facilities and equipment for rearing parasites and predators were expanded at the Otis AFB laboratory.

Pathogens

Diseased larvae amounting to 26½ quarts were collected in New York for virus extraction. The virus stock pile amounts to 2555.23 grams containing 169.455 times 10^{12} polyhedra. Efforts to determine biological activity of this stored virus according to age groups has been initiated.

A suspension of 250 billion polyhedra was applied to a one acre plot. Due to a population decline accurate measure of percent control was difficult. Egg mass counts over 1/4 acre revealed a 75% egg mass reduction as compared to the check.

Attractants

A combined thin layer and gas chromatographic technique for anaylsis of gyplure samples was developed.

Weathering and aging studies indicate a four week period of activity with the synthetic-natural lure and a three week period of erratic activity with gyplure.

On Six-mile Island, Lake Winnipesaukee, New Hampshire concentrated gyplure in both liquid and granular formulations were applied by aircraft. Although active, the attractant sources were not sufficiently potent to compete with the native female population.

The second phase of the aerial saturation trapping test consisted of releasing a total of 56,632 traps in three separate drops at a 1/16th mile spacing over 46,843 acres in the Watchung Mountain Range and the Mt. Freedom-Mendham, New Jersey area. To assist in the evaluation, two one-square mile hand placement study areas were established. Traps placed at 1/16th mile intervals caught 2,265 moths; at a 1/32nd mile spacing traps caught 2,980 moths.

Bioassays of numerous gyplure and synthetic-natural attractant samples all gave negative results except one thin layer chromatographic fraction. This fraction was obtained from a sample of gyplure synthesized in 1964. Similar fractions submitted at that time were completely inactive.

Pupae were collected in Connecticut and Massachusetts to augment reserves of the natural sex attractant. Female moths were reared, aged, and abdominal tips clipped. Processing of the tips for attractant was accomplished by the Pesticide Chemicals Research Branch, ENT.

GYPSY MOTH (cont'd)

Mass Rearing

A constant temperature of 80°F. and 55% relative humidity accelerated growth of larvae reared on artificial diet. Hemlock extract added to the diet appeared to provide some protection from disease and a reduction in cannibalism.

With the acquisition of a new building at Otis AFB, a controlled temperature humidity chamber was constructed and investigations of mass rearing techniques were initiated. Larval production reached a peak of 27,600. Laboratory reared larvae and pupae were used to support studies involving the sterile male technique, attractants, pathogens, and parasite rearing.

SOIL BIOASSAY:

Of the 510 soil samples tested at the Otis laboratory this year, 357 were from the Eastern Region, 85 from the Central Region, 56 from the Southern Region and 12 from the Western Region.

PESTICIDE MONITORING

Fiscal Year 1966

Close cooperation was maintained throughout the Region with liaison officers, state pesticide boards, and state pesticide coordinators. Each was apprised of all major control efforts involving the use of pesticides.

Information was gathered for Division use on accidents where agricultural pesticides were suspected of being the causative agent. The assistance of state pesticide coordinators and state public health services was solicited in reporting of agricultural pesticide accidents and incidents. Poison control center reports of accidents were supplied by the state public health agencies.

In order to develop information on pesticide residue levels in varied environments, soil samples were collected from predesignated areas having high, low, and non use pesticide histories. Samples were collected in the fall and spring in high use areas and pesticide usage histories updated with each collection. In the low and non use areas samples were collected only once during the year.

In cooperation with the U. S. Army and Cornell University, soil sampling for determination of pesticide residues was initiated at Camp Drum, Watertown, New York.

In sandy soils treated with persistent pesticides, soil, crop and foliage samples were collected for translocation studies on potato, carrots, and peanuts.

Soil and duff samples taken from the 1965 Cape Cod, Massachusetts gypsy moth spray area by the Massachusetts Pesticide Board were analyzed by the Otis laboratory for Sevin residues. Detectable amounts of Sevin were present in samples collected seven months after application. A PPC contract was let to monitor the effects of this program on the major pollinators of cranberries. Associated with this contract 95 foliage, 11 bee, and 5 pollen samples were analyzed for Sevin residues.

Pesticide safety and the proper disposal of empty pesticide containers was continually stressed to farm groups, garden clubs, and youth organizations.

Fiscal Year 1966

Infestations of soybean cyst nematodes in the Eastern Region are known to exist only in the state of Virginia. Involved counties include Isle of Wight, Nansemond, Norfolk, Princess Anne, and Southampton. Surveys for delimiting, as well as detection purposes, were conducted in these counties and also in three outlying counties. As a result of the survey 30 new properties were found to be infested in Isle of Wight, Norfolk, Princess Anne, and Nansemond Counties. No infestations were encountered in the outlying counties. During the eight county survey, a total of 23,189 soil samples was collected on 1,913 properties, involving 19,551 acres of Virginia crop lands.

In New Jersey, a detection survey was conducted at selected sites in major soybean areas, soil samples being collected in fields where plants showed yellowing or other unusual symptoms. A total of 642 properties with an estimated acreage of 17,630 was surveyed. In addition to the foregoing, selected sites were also surveyed in Pennsylvania, Maryland, and Delaware. As in past surveys, positive findings were encountered only in Virginia.

Regulatory measures designed to control movement of farm machinery, equipment, and other regulated articles required an increasing amount of attention in Virginia. Most of the movement was intrastate. Radio-dispatched State cleaning crews continued to provide excellent service in the cleaning of farm and construction equipment moving out of the regulated area. The State provided other regulatory services as well. Affected growers and processing plants cooperated fully in prevention of spread endeavors.

The regulated area in Virginia was extended through a revision of Quarantine No. 79 dated December 14, 1965. Chesapeake City was included for the first time and additional properties were regulated in Isle of Wight, Nansemond, and Southampton Counties and Virginia Beach City.

Studies and experimental undertakings of assistance were continued by the Virginia Agricultural Experiment Station, Holland, Virginia.

SOYBEAN CYST NEMATODE
Fiscal Year 1966

State	SURVEY AND DETECTION				REGULATORY	
	Surveyed		InFested		Properties Inspected	
	Properties	Acres	Properties	Acres	Nursery	Other
Del.	2	2				
Md.	1	1				
N. J.	642	17630				
Penna.	7	61				
Va.	1913	19551	30	3629	4	1916
Total	2565	37245	30	3629	4	1916

WHITE-FRINGED BEETLE

Fiscal Year 1966

Surveys for this pest were conducted in New Jersey, Pennsylvania, Delaware, Maryland, Virginia, West Virginia, and the District of Columbia. Principal emphasis was in Virginia where surveys in 1962 and 1963 resulted in the discovery of infestation in the city of Norfolk and adjacent areas of Virginia Beach. During the most recent survey, i.e., summer-fall 1965, six new infestations were found--two each in the cities of Norfolk, Chesapeake, and Virginia Beach. Although infestation had previously been found in Chesapeake this marked the first time that occurrence had been encountered in the Western Branch Borough. Of major significance in this year's operations was the discovery of an outbreak in Maryland. First evidence of the latter infestation was discovered with the taking of specimens in the community of Temple Hills on July 13, 1965. Delimiting survey revealed that ten properties were involved. Cell specimens were determined as G. leucoloma striatus. In view of this development operations in Maryland were intensified and expanded. Surveys conducted in states other than Virginia and Maryland proved negative.

A total of 269 properties encompassing 324 acres was treated in the Temple Hills, Maryland area by State and Federal personnel. Dieldrin, Sevin, and DDT were used.

In Virginia, 2,126 acres were treated in Chesapeake, Norfolk, Oceana, and Virginia Beach. Treatments were applied by the State Department of Agriculture and the U. S. Navy in cooperation with PPC. granular dieldrin and DDT were used. DDT was also used as a foliage spray.

The state of Virginia and affected industries cooperated in the treatment of equipment and regulated articles moving from the area under quarantine. Cooperation also was received from a single nursery located inside the Temple Hills, Maryland infested area. This establishment was treated in its entirety with residual insecticides. Plant materials destined for shipment received certification treatment.

WHITE-FRINGED BEETLE
Fiscal Year 1966

State	SURVEY AND DETECTION		CONTROL	REGULATORY			
	Acres		Acres	Properties Inspected		Acres Treated	
	Surveyed	Infested	Treated	Nursery	Other	Soil	Foliage
Del.	1083				2		
D. C.	23						
Md.	5303	53	324	29	13	8	
N. J.	20						
Penna.	188						
Va.	37622	315	2126	14	2568	72	
W. Va.	477						
Total	44716	368	2450	43	2583	80	

WITCHWEED

Fiscal Year 1966

Particular emphasis was given to the cooperative survey for witchweed in the southern sectors of Virginia due to proximity to the infested areas of North Carolina and traffic between the two States. It is not uncommon for tobacco transplants to be brought into Virginia from suspect areas for planting adjacent to corn, sorghum, or other host crops. In the counties most heavily surveyed, a majority of the tobacco fields, barn lots, and adjacent fields were checked.

In the states of Delaware, Maryland, New Jersey, New York, West Virginia, Pennsylvania, and Maine similar surveys were conducted on a less intensive basis throughout the corn growing areas. A total of 3,765 properties was surveyed in the Region. No evidence of infestation was encountered.

Many State and Federal employees assigned to the survey received prior training in survey techniques in the affected area of North Carolina.

PART IV

MEXICO REGION

PLANT PEST CONTROL DIVISION - A.R.S. - U.S.D.A.

IN COOPERATION WITH

DIRECCION GENERAL DE SANIDAD VEGETAL - S. A. G.

ANNUAL REPORT
FISCAL YEAR 1966

PLANT PEST CONTROL

COOPERATIVE PROGRAMS

MEXICO REGION

ANNUAL REPORT

FISCAL YEAR

1966

United States Department of Agriculture
Agricultural Research Service
Plant Pest Control Division

PLANT PEST CONTROL COOPERATIVE PROGRAMS

In accordance with our Memorandum of Understanding with Mexico, the Plant Pest Control Division of the United States Department of Agriculture and the Sanidad Vegetal of the Mexican Department of Agriculture and Livestock cooperated in the preparation of work plans and the accomplishment of the Boll Weevil, Citrus Blackfly, Insect Detection, Khapra Beetle, Mediterranean Fruit Fly, Mexican Fruit Fly and Pink Bollworm programs of the Mexico Region.

INDEX

BOLL WEEVIL

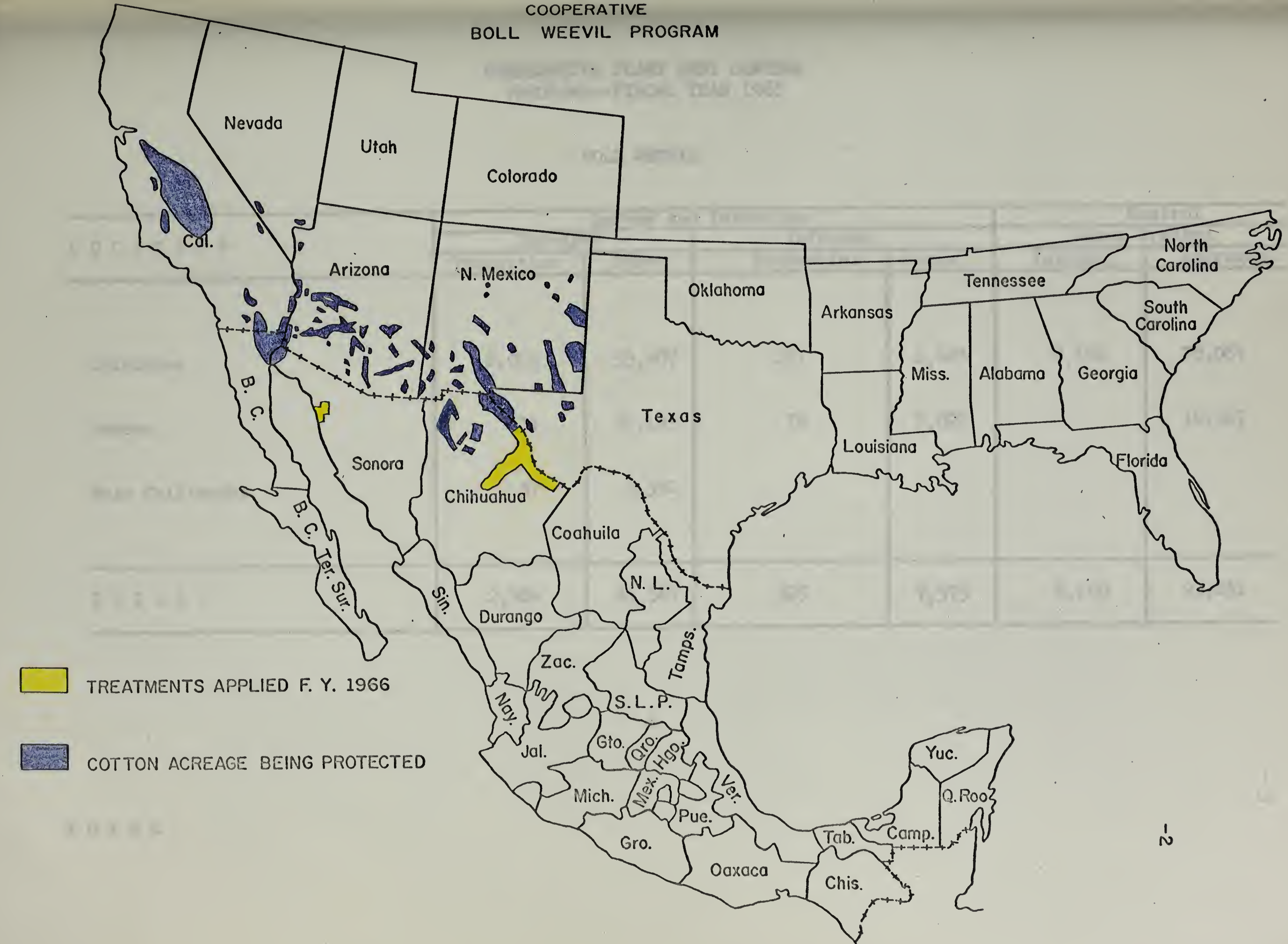
Surveys for detection of the boll weevil were conducted in Northern Chihuahua, Northwest Sonora and Baja California. These areas are not known to be infested by the boll weevil. Results of the survey were negative.

Surveys to determine the infestation levels and for diapause studies were conducted in the Ojinaga, Chihuahua Area along the Rio Grande and Conchos Rivers. Ground trash inspections were made in this same area to check on overwintering survival. Two weevils were collected from two samples of trash.

The control treatment area in the Ojinaga, Chihuahua area was expanded to include all cotton along the Rio Grande River from Santa Elena to El Cuervo, Chihuahua and along the Conchos River from Ojinaga to Estación Falomir, Chihuahua. Eight applications of low volume undiluted Malathion were made, four at five day intervals followed by four at ten day intervals. These treatments were initiated in early September and were coordinated with treatment of cotton in adjacent - areas in Texas. These applications were for the purpose of suppressing or eradicating diapausing weevils to provide a barrier between this generally infested area of Chihuahua and the free area to the North. Survey at the end of the year indicated that reduction of the boll weevil was obtained.

A fall control program, using methyl parathion diluted in water for three applications and undiluted low volume Malathion for the fourth was conducted at La Salina, Sonora. Surveys to determine pre-treatment intensity of infestations were made as well as mortality counts after each application and a final survey to check winter survival inside and outside the treatment area. Results of the treatment were good.

COOPERATIVE
BOLL WEEVIL PROGRAM



COOPERATIVE PLANT PEST CONTROL
PROGRAMS--FISCAL YEAR 1966

BOLL WEEVIL

LOCATION	Survey and Detection				Control	
	Surveyed		Infested		Acres Treated	
	Properties	Acres	Properties	Acres	Initial	Aggregate
Chihuahua	2,013	33,487	251	1,623	8,160	78,064
Sonora	434	32,143	74	5,892		14,567
Baja California	137	5,931				
TOTALS	2,584	61,561	325	7,575	8,160	92,631

TOTAL

CITRUS BLACKFLY - CHEMICAL CONTROL

The State of Nuevo León and the Northern portions of Baja California, Sonora and Tamaulipas are designated as chemical control zones in which any infestations of citrus black fly which might occur are eradicated through the use of insecticides.

Surveys for detection were conducted during the year in the chemical control zone. Light infestations were found in Southeastern Nuevo León and adjacent to the international border in North-eastern Tamaulipas. Surveys were negative in Baja California and Sonora.

At the end of the year, all infestations had received three applications of Trithion except three; two of these had been treated twice and one had received the initial application.

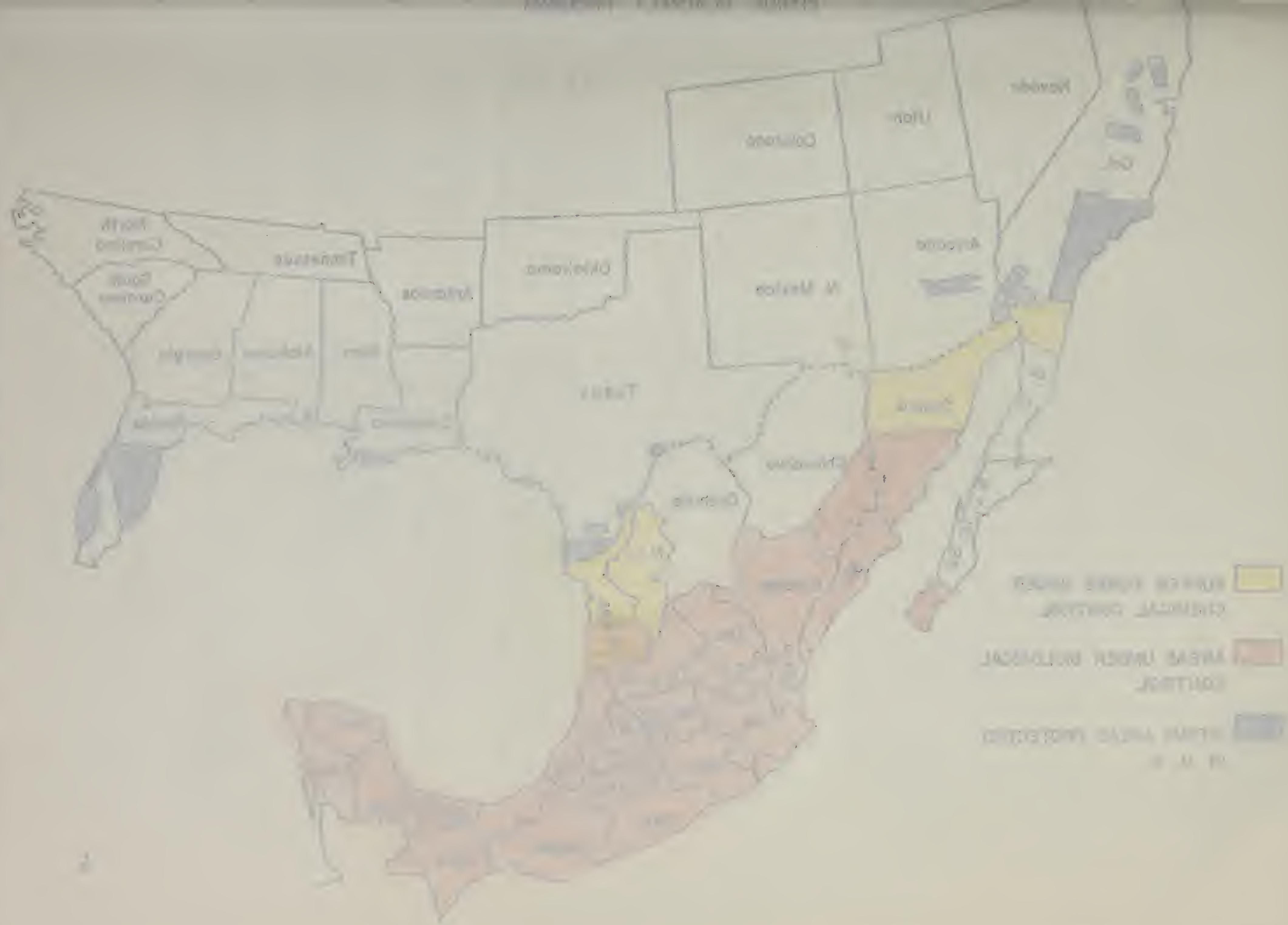
Quarantine inspections are maintained at strategic points to intercept host material as it is moved from the infested zones in Mexico to the chemical control zone. Inspections were made at packing sheds to certify citrus fruit for movement from Mexico through the United States.

CITRUS BLACKFLY - BIOLOGICAL CONTROL

The biological control zone generally includes that area of México not designated as the chemical control zone and the States of Coahuila and Chihuahua. The maintenance of citrus blackfly infestations at reduced levels through the use of parasites reduces the possibility of infestations in the chemical control zone.

Surveys were made in the biological control zone to determine the degree of parasitization and levels of citrus blackfly infestations. The surveys revealed that most of the infested trees in the biological control zone were afforded what is considered to be commercial control. However, a few medium infestations were found. Applications of insecticide, Trithion, were made in a few areas to quickly reduce the infestations. Parasites, mostly *Prospaltella opulenta*, captured at other sites were released afterwards in the treated areas. Approximately two million parasites were captured during the year for release in areas of low parasitization. Most of these parasites were shipped to Mexico City for distribution by Sanidad Vegetal to areas determined to have low parasite populations. The remaining parasites were released in Tamaulipas.

COOPERATIVE
CITRUS BLACKFLY PROGRAM



COOPERATIVE PLANT PEST CONTROL
PROGRAMS--FISCAL YEAR 1966

CITRUS BLACKFLY

LOCATION	Survey and Detection		Control	Regulatory		
	Hosts		Host Plants	Inspections		
	Examined	Infested	Treated	Packing Sheds	Vehicles	Other
BAJA CALIFORNIA	11,458					
NUEVO LEON	907,185	111	28,892	256	572	174,427 (boxes of fruit)
SONORA	91,164		2,094			
TAMAULIPAS	275,249	5,714	13,064			
TOTAL	1,285,056	5,825	44,050	256	572	174,427

COOPERATIVE PLANT PEST CONTROL
PROGRAMS--FISCAL YEAR 1966

CITRUS BLACKFLY (BIOLOGICAL)

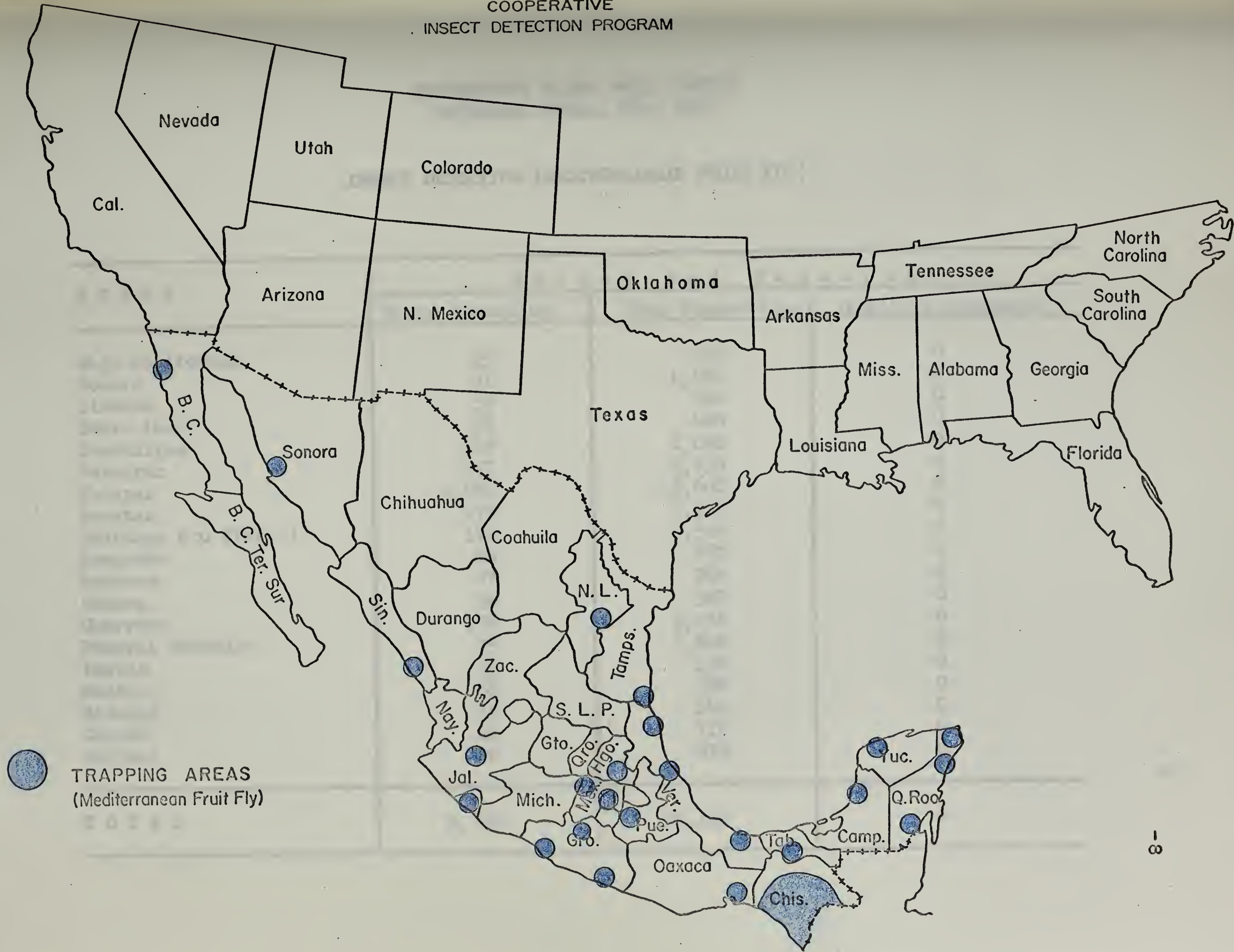
STATE	Survey and Detection		Control
	Hosts		
	Examined	Infested	Host Plants Treated
Tamaulipas	244,533	5,707	12,754
TOTALS	244,533	5,707	12,754

INSECT DETECTION

Surveys for detection of the Mediterranean fruit fly using Steiner traps baited with Trimedlure were carried out in Mexico in those areas considered to be most vulnerable to the introduction of this pest. These include seaports, international airports, and those areas which border along Guatemala and British Honduras to the south. Results of these surveys were negative.

Trapping with multiple lure traps in several locations was also negative for the Oriental, Melon and Queensland fruit flies.

COOPERATIVE
INSECT DETECTION PROGRAM



COOPERATIVE PLANT PEST CONTROL
PROGRAMS--FISCAL YEAR 1966

INSECT DETECTION (MEDITERRANEAN FRUIT FLY)

STATE	Survey and Detection		
	Traps Installed	Trap Inspections	Positive Specimens
Baja California	25	304	0
Sonora	91	1,184	0
Sinaloa	33	264	0
Nuevo Leon	35	490	0
Tamaulipas	143	2,002	0
Veracruz	277	2,559	0
Chiapas	1,850	19,608	0
Yucatan	173	1,314	0
Quintana Roo (Terr.)	174	2,304	0
Campeche	68	380	0
Tabasco	27	264	0
Oaxaca	34	360	0
Guerrero	178	1,236	0
Federal District	75	1,800	0
Puebla	13	158	0
Mexico	38	388	0
Hidalgo	15	142	0
Colima	12	112	0
Jalisco	26	278	0
TOTAL	3,862	36,153	0

KHAPRA BEETLE

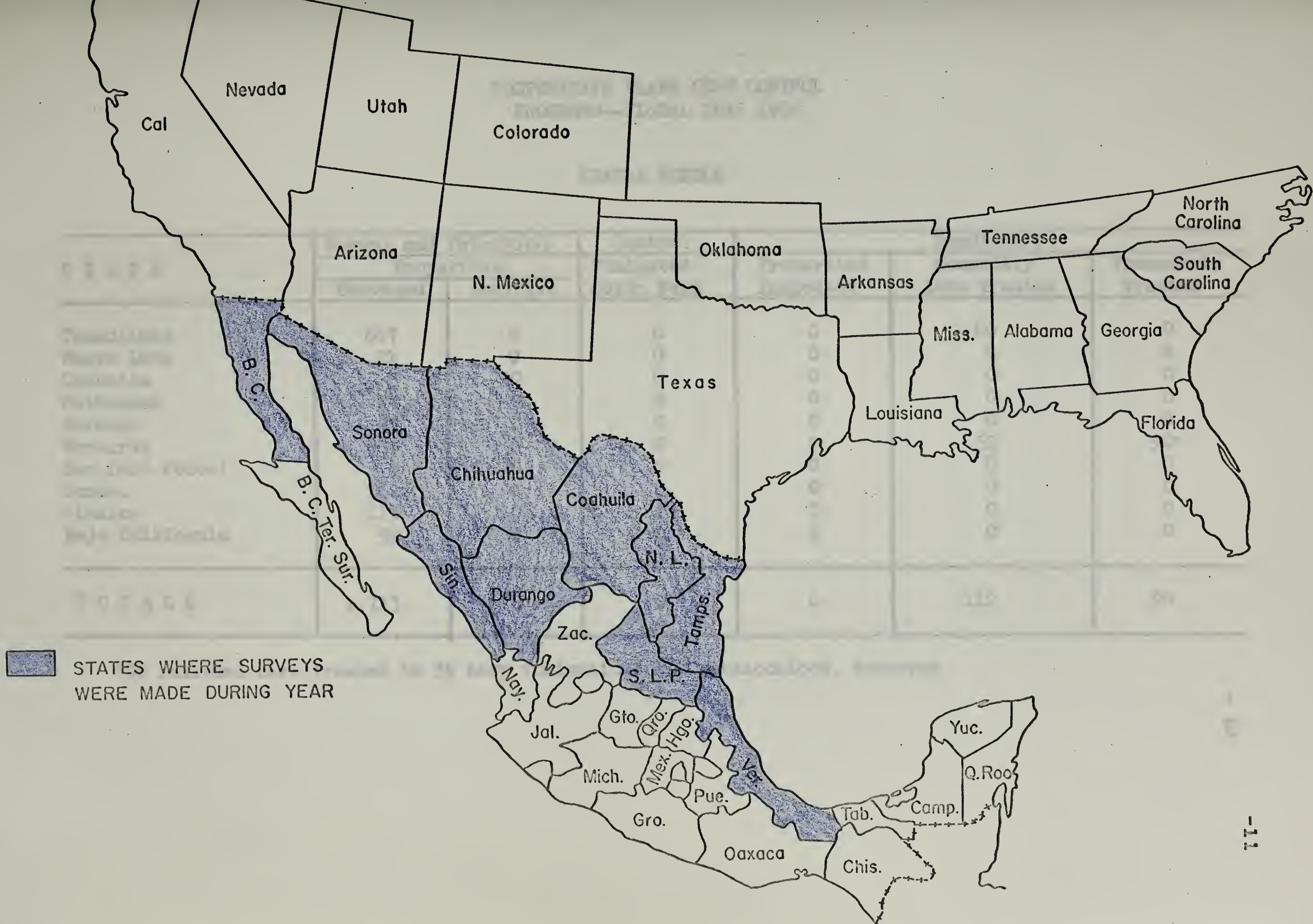
Surveys for detection of khapra beetle were conducted in ten states in México during the year. Properties inspected consisted of cargo ships arriving at Mexican ports, railroad cars and establishments which handle khapra beetle host material. Emphasis was given on survey of properties with khapra beetle history of infestation or exposure.

Five ships were found infested, four at Gulf of México ports and one at Ensenada, Baja California.

Regulatory treatments were given to a considerable amount of cargo off loaded from infested ships. One ship was fumigated at the port of Tampico, Tamaulipas.

There were no known infestations of khapra beetle in México at the close of the year.

COOPERATIVE
KHAPRA BEETLE PROGRAM



COOPERATIVE PLANT PEST CONTROL
PROGRAMS--FISCAL YEAR 1966

KHAPRA BEETLE

STATE	Survey and Detection		Control	Regulatory		
	Properties		Fumigated Cubic Feet	Properties Inspected	Commodity Lots Treated	Transports Treated
	Surveyed	Positive				
Tamaulipas	647	0	0	0	60	0
Nuevo Leon	21	0	0	0	0	0
Coahuila	3	0	0	0	0	0
Chihuahua	24	0	0	0	0	0
Durango	5	0	0	0	0	0
Veracruz	684	0	0	0	52	90*
San Luis Potosi	4	0	0	0	0	0
Sonora	152	0	0	0	0	0
Sinaloa	115	0	0	0	0	0
Baja California	58	0	0	0	0	0
TOTALS	1,713	0	0	0	112	90

*90 railroad cars treated in 39 tarp fumigations at Coatzacoalcos, Veracruz

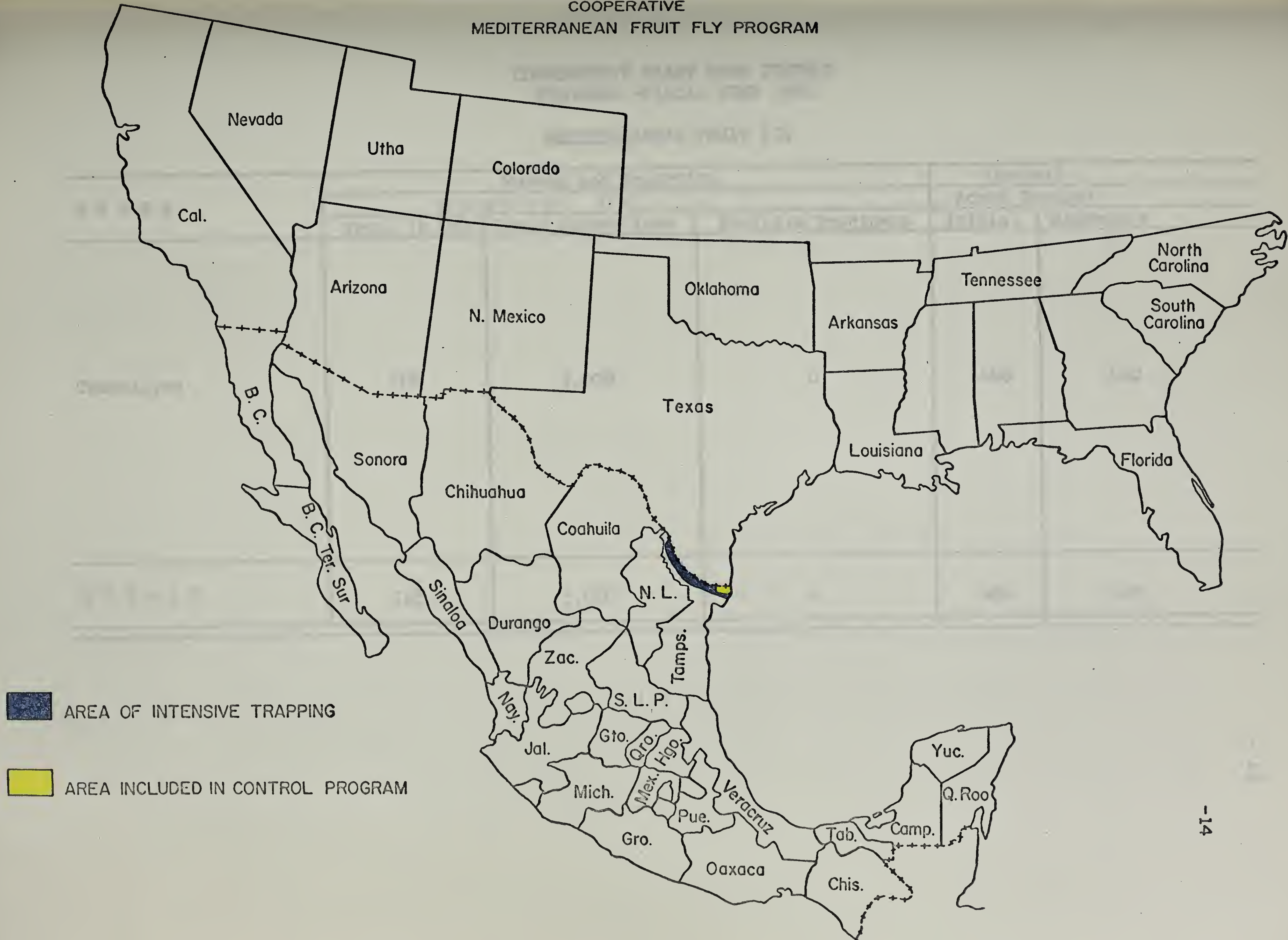
MEDITERRANEAN FRUIT FLY

The detection of Mediterranean fruit fly in Texas on June 13 near the International Border instigated an intensive survey and trapping operation in north-eastern Tamaulipas. Traps were placed in service from the Gulf of México along the Río Grande to Río Bravo,Tamaulipas. Fallen fruit from all available host plants was inspected for larval infestation. Survey results were negative.

A portion of the city of Matamoros is to be included in the peripheral zone to be sprayed in an eradication treatment program.

The spray program was initiated in June 28 and consisted of aerial application of low volumne Malathion at the rate of 2 ounces per acre.

COOPERATIVE
MEDITERRANEAN FRUIT FLY PROGRAM



COOPERATIVE PLANT PEST CONTROL
PROGRAMS--FISCAL YEAR 1966

MEDITERRANEAN FRUIT FLY

STATE	Survey and Detection			Control	
	Number Of			Acres Treated	
	Traps in Use	Traps Inspections	Positive Specimens	Initial	Aggregate
Tamaulipas	718	3,008	0	400	400
TOTALS	718	3,008	0	400	400

[illegible]

[illegible]

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

MEXICAN FRUIT FLY

The areas of Northwest and North Central Sonora and Northern Baja California, although not known to have established infestations of the Mexican Fruit Fly, are subject to recurring infestations annually. Both these areas border along and are adjacent to important citrus producing areas in the United States. These recurring infestations occur generally during the mango shipping season from further south in Mexico and are apparently caused by the insect being brought to the area in contraband host fruits from infested areas.

Surveys, using McPhail traps, were conducted in the areas of Baja California and Sonora mentioned above. Trapping operations were negative for Sonora but positive specimens were captured in Baja California. Fallen host fruits were examined for larval infestation. Results were negative.

The eradication program at Tijuana, Baja California, releasing marked tepa sterilized Mexican fruit fly males, continued from July 1 until November 17, 1965. There were twelve releases during this period. For the same period, 9 releases were made of both sterile male and female flies at Ensenada, Baja California.

Native Mexican fruit flies were trapped in the spring of 1966, indicating the occurrence of a reinfestation.

A Mexican fruit fly rearing facility was established at Monterrey, Nuevo León, México in January 1966. A change was made in the eradication program procedures for Baja California. Flies were reared at the Facility and pupae sterilized with gamma irradiation from a Cobalt 60 source were shipped for release at Tijuana, Tecate, and Ensenada. The pupae were dyed and placed in release stations located in selected sites. The sites were chosen to give adequate coverage of treatment areas, taking into consideration the availability of host and shade trees, proximity to fruit markets, and other environmental factors. Weekly releases of sterile pupae, male and female, began on April 20 and continued through June 30.

Regulatory programs under the legal authority of the Dirección General de Sanidad Vegetal continued with the operation of inspection stations on highways, railroads, airports and seaports to regulate the movement of host fruits. Inspections were made of Post Offices, and fruit markets in the treatment area to intercept contraband shipments of host products.

Fumigation chambers were maintained at Benjamín Hill, Sonora and Ensenada, Baja California for the treatment of commercial shipments of host fruits into Northern Sonora and Baja California. Treatments at a commercial fumigation chamber at Hermosillo, Sonora were under supervision of Plant Pest Control Division and Sanidad Vegetal.

COOPERATIVE PLANT PEST CONTROL
PROGRAMS--FISCAL YEAR 1966

MEXICAN FRUIT FLY

STATE	Survey and Detection			Control		Regulatory		
		Infested		Chemical	Biological		Properties Inspected	
	Traps Installed	Properties	Acres	Acres Treated	Flies Released (units 1,000)	Citrus Acress Trapped	Processing Plants	Other
Baja California	795	0	0	0	9,420	0	0	0
Sonora	50	0	0	0	0	0	0	0
TOTALS	845	0	0	0	9,420	0	0	0

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Surveys for detection of pink bollworm were conducted in Sinaloa, Sonora, Baja California, Tamaulipas, and Veracruz. Surveys were intensified in the cotton growing areas of Northwest Sonora and Northern Baja California due to the proximity of infestations in the State of Arizona. Argon light traps and modified Frick traps baited with natural sex lure or propylure were used as survey tools along with gin trash machines. Visual inspections of blooms and bolls, as well as lint cleaner inspections, were also made. Infestations were found at Mexicali, Baja California and San Luis Rio Colorado, Sonora. Survey also indicated the presence of pink bollworm in southern Tamaulipas.

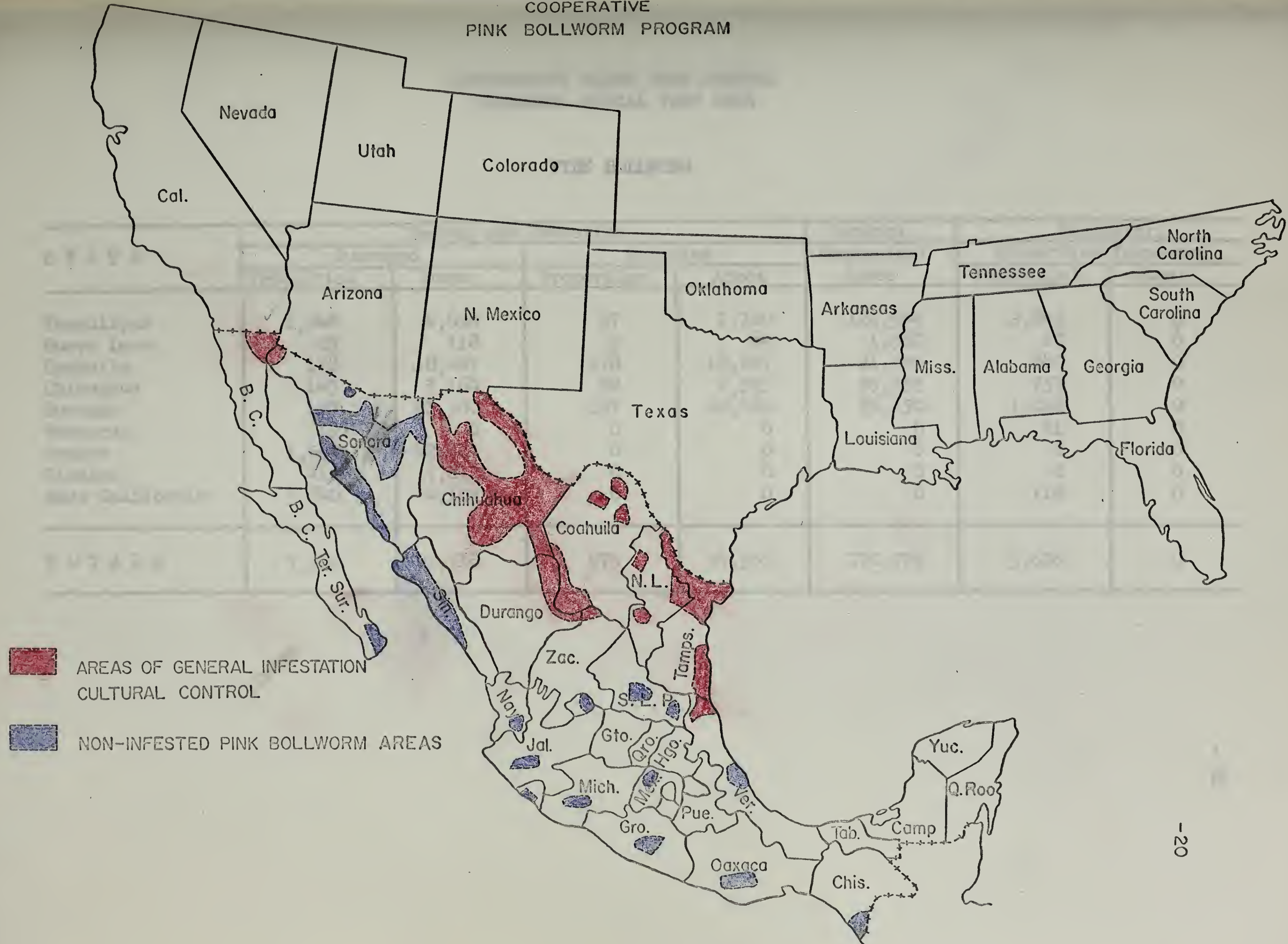
Surveys were made in the generally infested areas of Mexico to determine population levels. These surveys showed a slight late season build up of pink bollworm in the Juárez, Chihuahua area.

Control measures included cultural control through the use of fixed planting and stalk destruction dates in the infested areas. Similar measures are extended to the non-infested areas as a preventive action. Applications of insecticides were applied by growers in the infested areas to control the pink bollworm.

Regulatory activities included the operation of strategically located inspection stations to restrict the movement of non-treated host material from the infested area to Northwest Mexico. Contaminated trucks and rail cars were cleaned or fumigated as necessary at these stations.

Regulatory visits were made to processing plants to check for compliance with sanitation and handling requirements for certification of products for entry into the United States. Supervision of approved treatments as a basis for movement was also given. One processing plant failed to meet the requirements and was non-certifiable at the close of the year. The whole of Mexico is now considered an approved area.

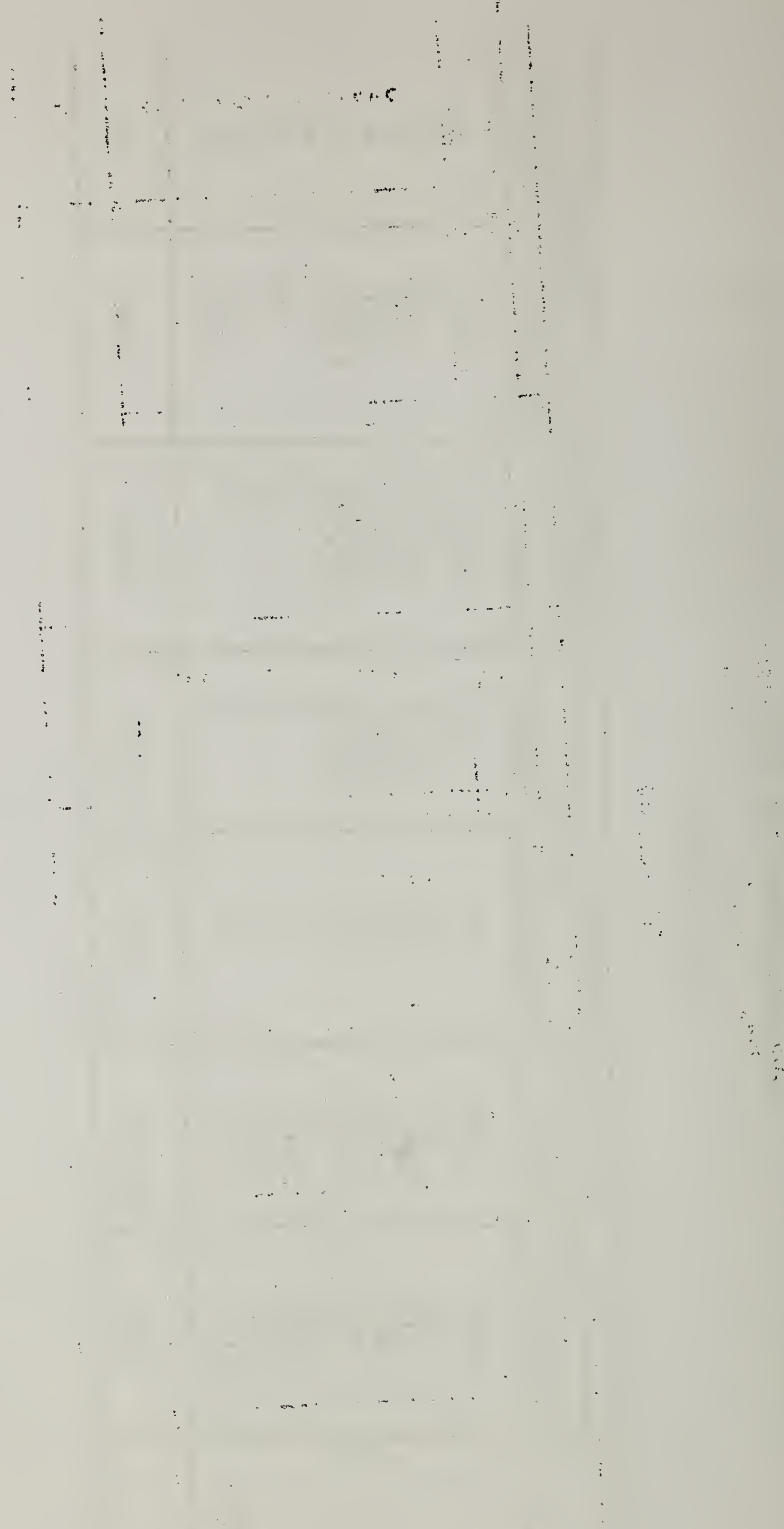
COOPERATIVE
PINK BOLLWORM PROGRAM



COOPERATIVE PLANT PEST CONTROL
PROGRAMS--FISCAL YEAR 1966

PINK BOLLWORM

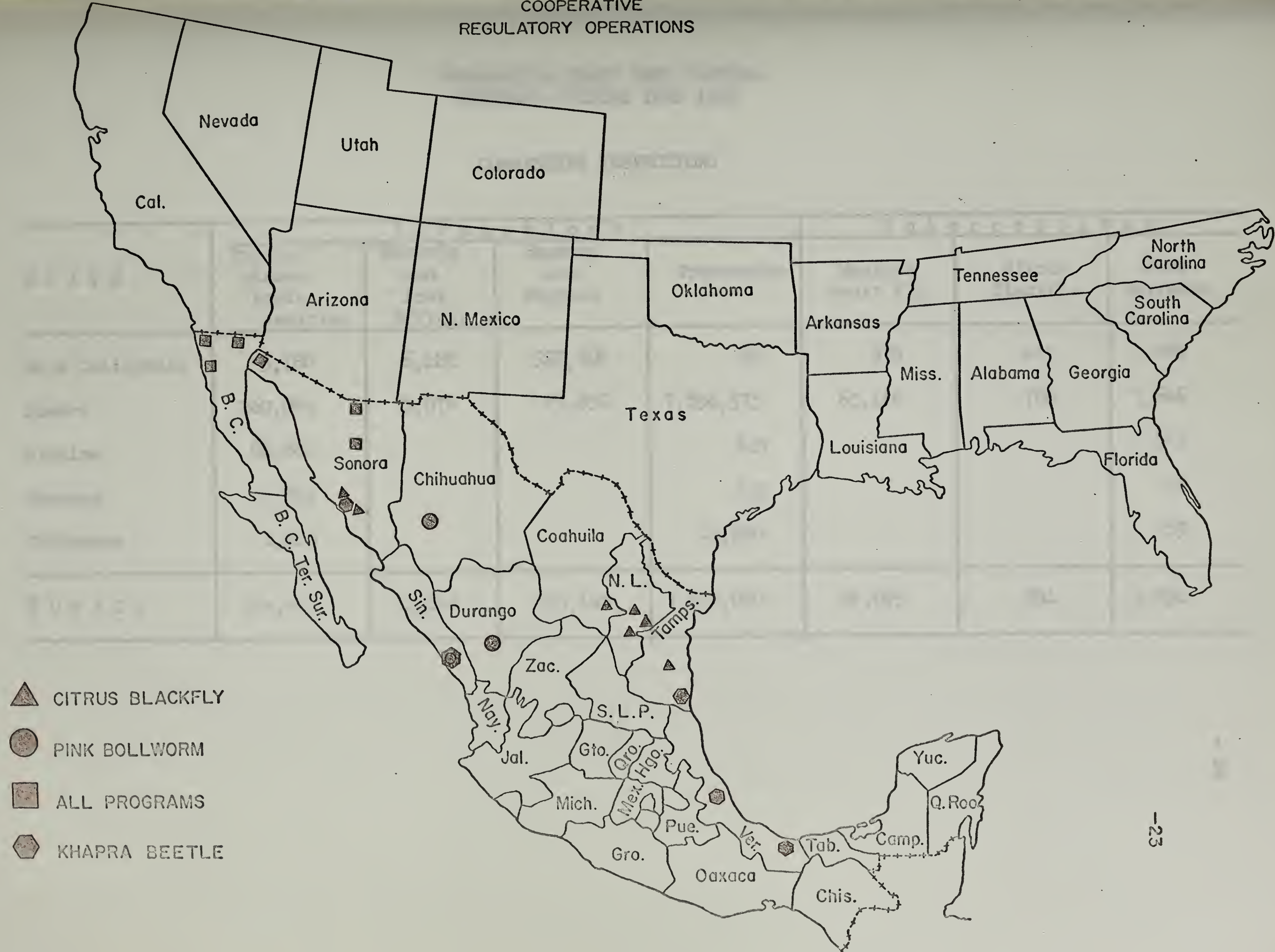
STATE	Survey and Detection				Control	Regulatory	
	Surveyed		Infested		Mechanical	Properties Inspected	
	Properties	Acres	Properties	Acres	Acres	Industrial	Other
Tamaulipas	1,048	4,898	97	1,720	122,944	2,843	0
Nuevo Leon	29	118	9	89	1,562	27	0
Coahuila	178	18,247	178	18,247	21,690	840	0
Chihuahua	145	3,169	92	2,395	95,533	737	0
Durango	197	21,500	197	22,485	29,250	1,022	0
Veracruz	19	0	0	0	0	21	0
Sonora	1,589	42,464	0	0	0	0	0
Sinalca	415	7,217	0	0	0	0	0
Baja California	3,740	4,103	0	0	0	116	0
TOTALS	7,360	101,716	573	44,936	270,979	5,606	0



QUARANTINE INSPECTIONS

Quarantine inspections were carried out at strategic points. The locations included railroad stations, seaports, highways and airports. Markets and Post Office inspections were also made. The quarantine inspections resulted in the interception and destruction of large quantities of hazardous host material from infested areas in Mexico, destined for non-infested areas in North Mexico bordering on the United States; likewise, material from East Mexico were cleaned or fumigated insuring protection for the pink bollworm free West Coast cotton producing area of Mexico. Large amounts of commercial shipments of Mexican fruit fly hosts were fumigated before being allowed to proceed into Northern Sonora of Baja California.

COOPERATIVE REGULATORY OPERATIONS



COOPERATIVE PLANT PEST CONTROL
PROGRAMS--FISCAL YEAR 1966

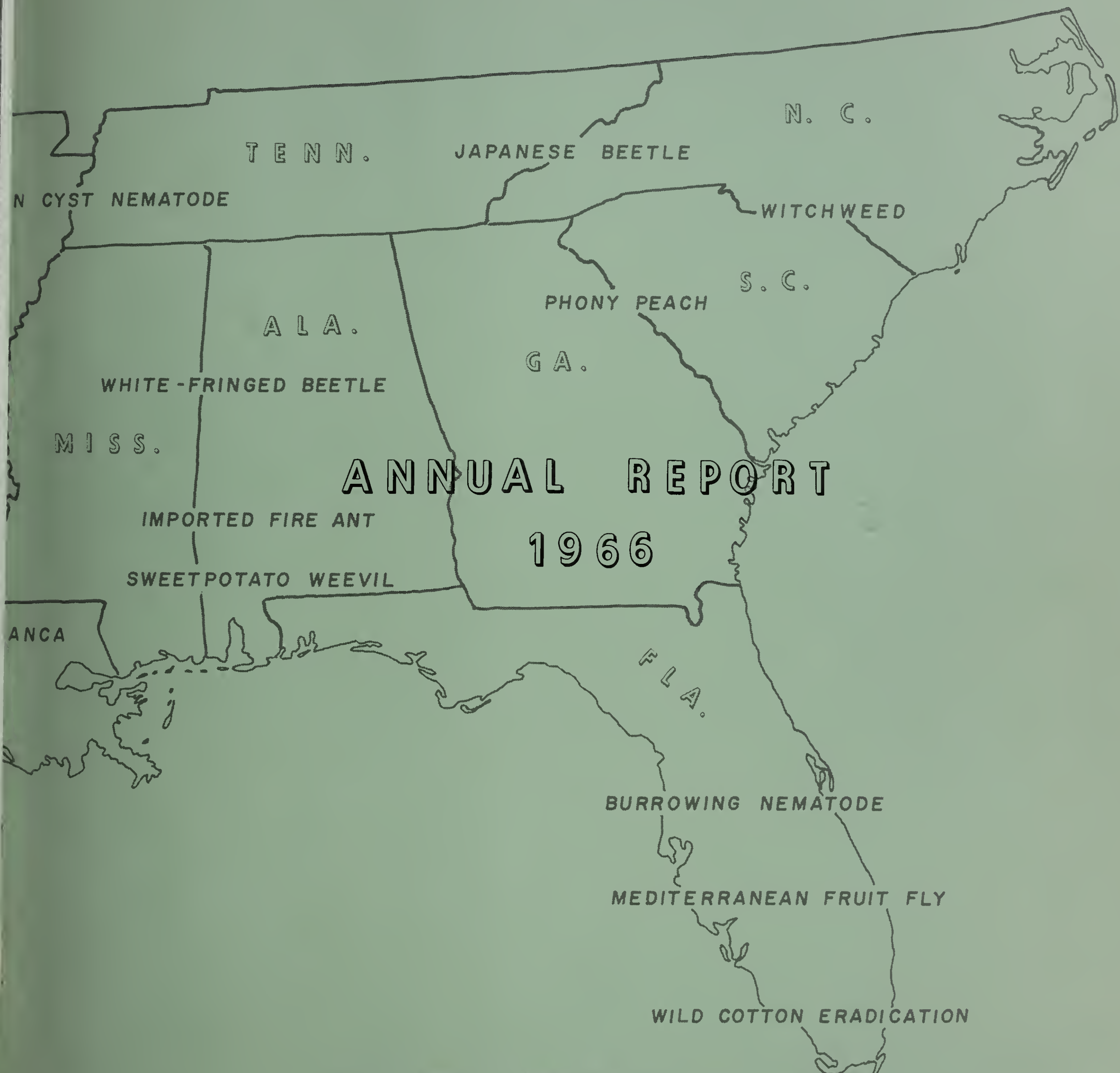
QUARANTINE INSPECTIONS

STATE	Inspections				Interceptions		
	Trains planes boats vehicles	Markets and Post Offices	Baggage and Express	Treatments -.-	Mexican Fruit Fly	Citrus Blackfly	Pink Bollworm
Baja California	3,768	6,122	527,304	69	979	125	285
Sonora	269,840	5,074	25,836	7,836,573	63,116	766	7,646
Sinaloa	86,886			427			1,545
Durango	2,831			125			96
Chihuahua	1,118			15,626			259
TOTALS	364,443	11,196	553,140	7,852,820	64,095	891	9,831

PART V

PLANT PEST CONTROL PROGRAMS

OF THE SOUTHERN REGION



ANNUAL REPORT

1966

UNITED STATES DEPARTMENT OF AGRICULTURE

AGRICULTURAL RESEARCH SERVICE

PLANT PEST CONTROL DIVISION

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UNITED STATES DEPARTMENT OF AGRICULTURE
AGRICULTURAL RESEARCH SERVICE
PLANT PEST CONTROL DIVISION

ANNUAL REPORT
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SOUTHERN REGION

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I N   M E M O R I A M

Mills B. Koonce
PPC Inspector
Big Spring, Texas
October 17, 1965

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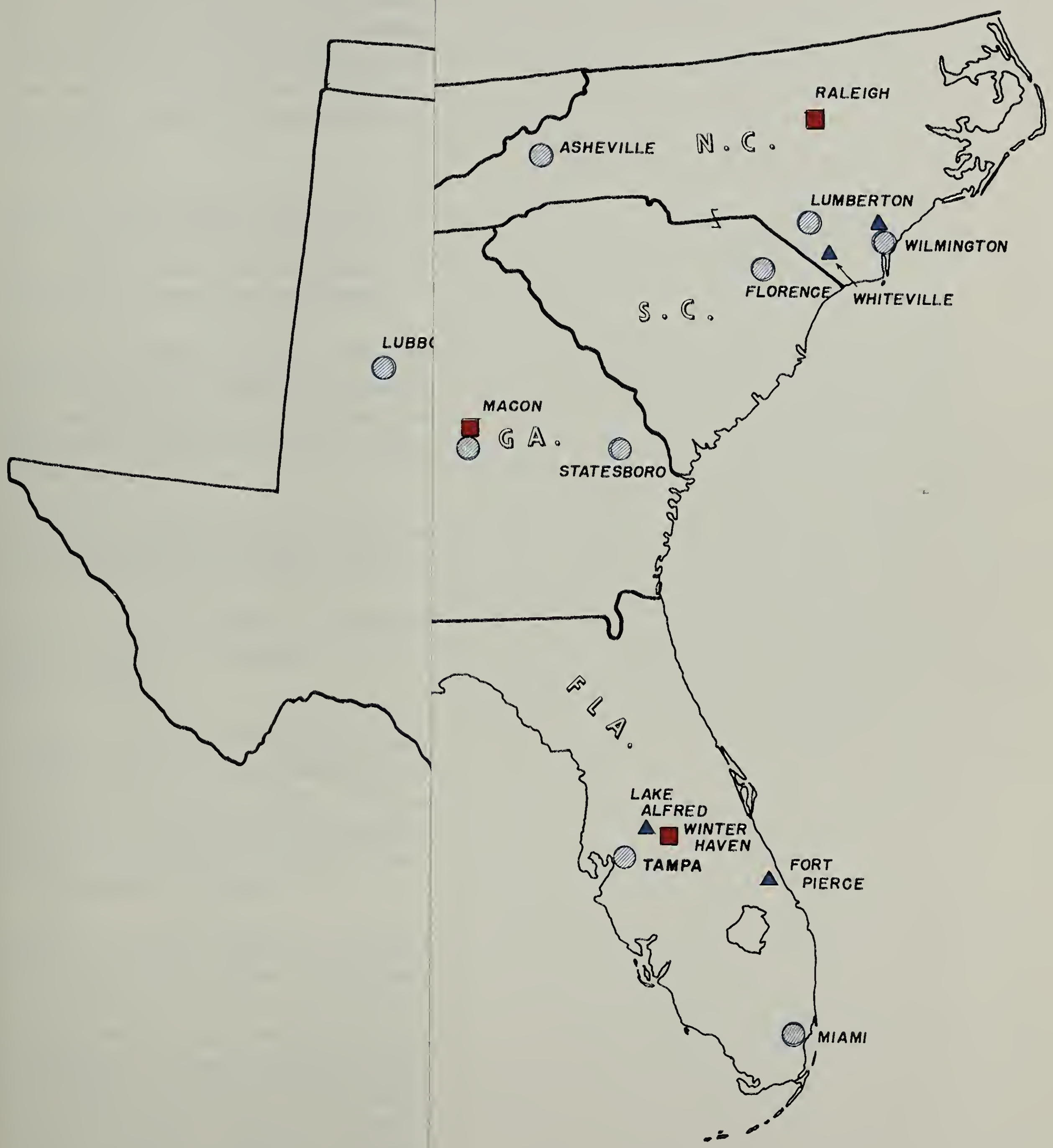
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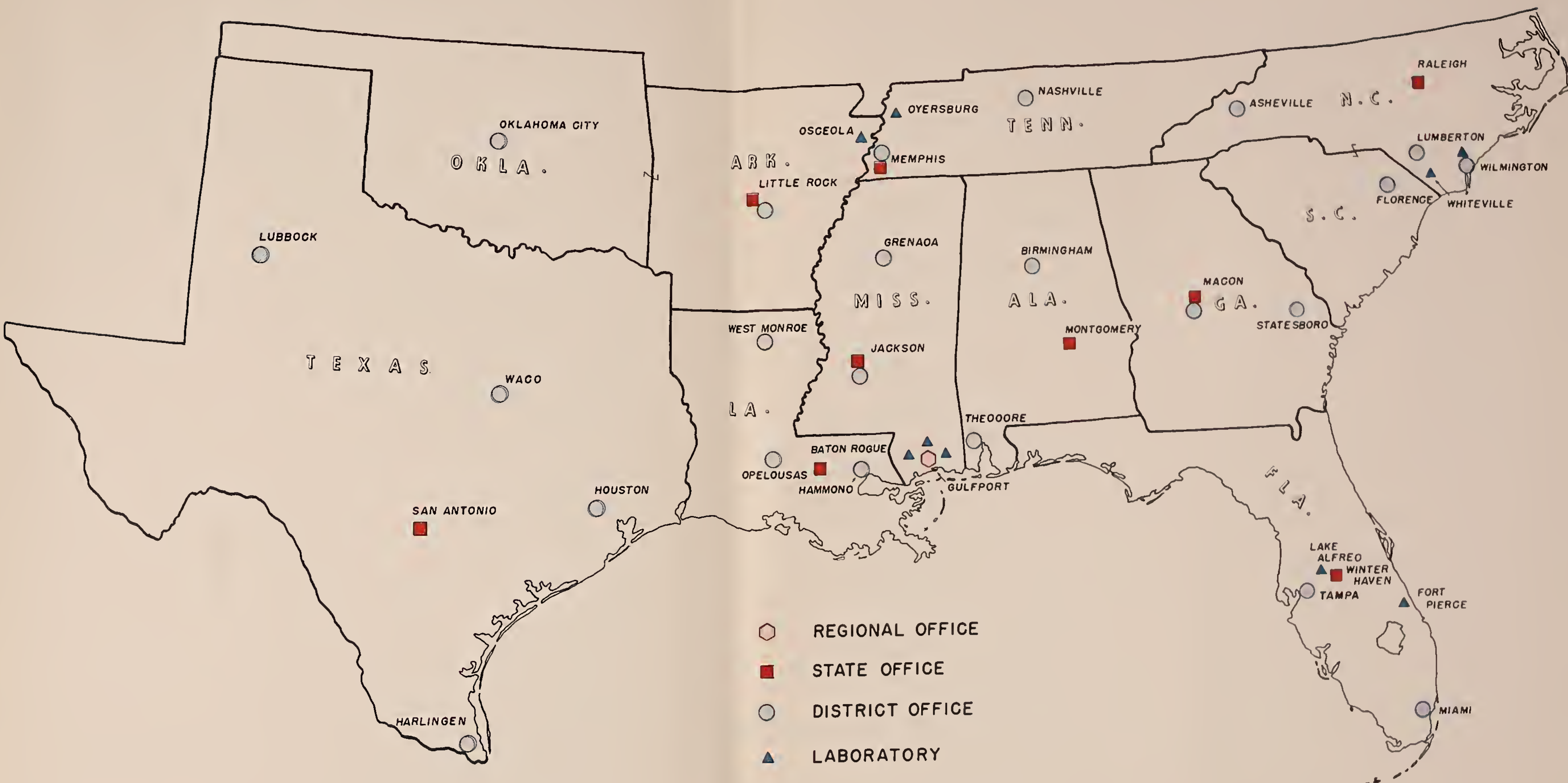
S. C.
LUBBO
MACON
G A.
STATESBORO
F L A.
LAKE ALFRED
WINTER HAVEN
TAMPA
FORT PIERCE
MIAMI

UNITED STATES DEPARTMENT OF AGRICULTURE
AGRICULTURAL RESEARCH SERVICE - PLANT PEST CONTROL DIVISION
SOUTHERN REGION



ASSOCIATED ACTIVITIES

The principal objectives of this program during fiscal year 1966 were personnel training, dissemination of information on PPC activities to the general public, and the reduction of accidents through safety practices and procedures.

The President's "Mission Safety 70" program occupied much thought and application. Since safety practices within PPC may affect the general public also, the overall programs of general safety and pesticide safety are of paramount interest to all personnel. Safety placards, leaflets, articles, and bulletins were distributed regularly to all employees. In the general orientation given new and L/A employees, safety was included along with conduct and procedures.

Several employees were able to attend Federal Safety Council meetings, where they had the opportunity to hear excellent discussions on the subject. In most instances, arrangements were made for these employees to make subsequent reports to their co-workers.

In some States, Safety Committees were formed and meetings held, with interesting and pertinent programs presented. These Committees were charged with the responsibility of studying accidents which occurred in their areas and, if possible, determining the cause and developing countermeasures against a recurrence.

Periodic safety checks were made of offices, storage spaces, and vehicles; and any deficiencies noted were corrected immediately.

A few of the States, Alabama and Texas in particular, are encouraging submission of safety slogans as a means of sustaining and intensifying interest in this subject.

Program training to enable employees to attain higher degrees of competency in their work assignments is extremely important to the functions of PPC. During the fiscal year, the Regional Training Advisor visited all State offices for training conferences with supervisory personnel on proposed individual training programs. As a result, 178 employees received 10,865 hours of program training.

Several of our chemists attended college short courses for special work in the operation of new and improved analytical equipment.

Approximately 25 members of the Headquarters Staff had the opportunity of attending a Communications Workshop sponsored by the Mississippi Coast Federal Administrators Association. This program was presented to better prepare Government people to communicate with the general public. Four employees of the Southern Region attended the Supervisory Development Program offered by the Southern Administrative Division in November 1965, and three employees participated in the Middle Management Seminar in December 1965; both courses were held in Atlanta, Georgia.

An administrative workshop was conducted in Gulfport in May 1966, with clerical assistants from each State office in the Southern Region and five representatives of the Western Region in attendance. Staff members of the Southern Administrative Division in New Orleans, Louisiana, and of the Plant Pest Control Division Administrative office in Hyattsville assisted in conducting the meeting.

Personnel of the Region continued to make every effort to inform the general public of PPC programs and activities. During the year, numerous talks were made by employees before service and garden clubs, farm organizations, school groups, and on radio and television. Films, slides, and program literature were used where practicable.

Cooperative State-Federal Insect Pest Displays were exhibited and program literature distributed at numerous State and local fairs where our displays attracted much attention. At two Alabama State Fairs, one at Birmingham and the other at Montgomery, colonies of living imported fire ants, exhibited in glass containers, served as a special attraction.

In one North Carolina work unit, the inspector, with the assistance of Extension Service and ASCS personnel, arranged for 47 newspaper articles, 73 radio programs, 3 television programs, 11 newsletters, and 72 meetings for the purpose of better informing the public of PPC programs in that area.

Student field days were held at the Gulfport Headquarters the first part of May. Some 275 students from the biology and chemistry classes of high schools along the Coast toured the office and laboratories. Other smaller groups visiting our facilities during the year represented various farm organizations and clubs. Of primary interest were the insect studies in progress, chemical studies of residues in soil and water, and insect taxonomy. Kits containing information on the different programs were distributed to all visitors.

Members of the Chemical Laboratory Staff served as judges for several science fairs at local schools and, also, participated in High School Career Day conferences at State colleges.

Because of widespread interest in garden plants, many of which are poisonous, a picture series and accompanying lecture were developed on this subject. In Gulfport, a total of 70 garden club members saw and heard the presentation in fiscal year 1966 and several future showings have been requested.

In May 1966, the Regional Headquarters was given the opportunity of preparing an exhibit for a home show presented by the Mississippi Home Builders Association. During the four-day exhibition period, several thousand copies of program information were distributed.

In cooperation with other Federal agencies on the Gulf Coast, Regional Headquarters participated in a film venture during fiscal year 1966. This film is expected to be released in the near future for use in acquainting interested groups with job opportunities in the Federal Government.

In a few States, PPC personnel have attended and represented our agency at area planning and development meetings, with the purpose of promoting the growth and development of these communities and providing better understanding of the purpose and service of the various organizations.

The Secretary's "Cleansweep" Campaign received much emphasis during the latter part of fiscal year 1966. "Operation Cleansweep" kits were forwarded to each office in the Region with instructions to follow through on a housecleaning program. In accordance with the Secretary's goal of a 20 percent reduction in paper accumulation, stocks of outdated publications and nonrecord material were destroyed. Offices and storage areas were checked to determine that they were well equipped, efficiently arranged, and neatly kept. Good cooperation was received, and considerable improvement was made in all field offices.

BARBERRY ERADICATION

The black stem rust of wheat, caused by the fungus Puccinia graminis, passes part of its life cycle on some species of barberry and mahonia plants. Spores produced on these plants reinfect plantings of wheat and other grains. Control of the rust consists of eradication of these secondary host plants, thus breaking the life cycle.

No eradication work is performed in the Southern Region; all activities are of a regulatory nature. To assure that only rust-resistant species are grown, an annual survey is made of all nurseries and sales lots where barberry and mahonia plants are handled. This prevents the shipment of rust-susceptible plants into States where an eradication program is in effect.

Except in two nurseries in Texas where some off-type plants were destroyed, only rust-resistant plants were found in all nurseries and sales lots inspected this season.

Table 1.--Barberry Eradication

State	Survey and detection			Control	Regulatory	
	Sq. mi. surveyed	Properties reinspected	No. properties found with bushes	Plants destroyed	No. nurseries inspected	Other properties inspected
Ala.					27	
Ark.					5	
Fla.					3	
Ga.					21	
La.					18	
Miss.					5	
N. C.					6	
Okla.					19	
S. C.					4	
Tenn.					42	
Texas					12	
Total					162	

BOLL WEEVIL

High Plains

The boll weevil, Anthonomus grandis Boheman, invaded the Texas High Plains in damaging numbers during the summer of 1962 and continued to move westward during 1963. By fall of 1963, the weevil had migrated to an area north of Silverton in Briscoe County; south to Lockney in Floyd County, Lorenzo in Crosby County, and Southland in Garza County; and 10 miles east of Tahoka in Lynn County.

The continued westward movement of the boll weevil caused great concern to the Plains cotton industry and prompted the organization of the High Plains Boll Weevil Committee. The Committee, sponsored by Plains Cotton Growers, Inc., was instrumental in obtaining funds and backing, which resulted in the accomplishment of their ultimate goal--the Diapause Control Program.

During the fall of 1964, cooperating agencies supervised the treatment and monitoring of 1,136,000 acres of cotton in the 9-county control zone. At the conclusion of the program, Extension Entomologists credited the low-volume malathion spray program with a 90-percent reduction in the weevil population, both in the field and in overwintering quarters.

Funds from cooperating agencies were available again in 1965. Based on previous recommendations, the program was continued, starting with a detailed survey during July and August in Briscoe, Crosby, Dickens, Floyd, Garza, Hall, Kent, Lubbock, and Motley Counties.

In Crosby County, the western boundary of the control zone above the Caprock was east of the 1964 boundary; while in Floyd County, it extended at one point approximately 10 miles west of the 1964 line. An important factor in checking the westward movement of the insect in Crosby County was the treatment of individual fields with LV malathion by local applicators as soon as each positive weevil find was reported by Plant Pest Control or Plains Cotton Growers survey teams.

The two-phase control program for reducing diapause boll weevil populations on the Texas Plains was begun on September 7, 1965. The first phase of the program consisted of three applications of chemical to be made at 5- to 7-day intervals, the objective being to break the reproductive cycle of the insect. The second phase consisted of four applications to be made at 10- to 14-day intervals, the objective being to kill adult weevils that might survive the first three applications or that might have developed from eggs laid after the start of the program. The seventh and final application of chemical was completed on November 17, 1965, with 1,512,548 aggregate acres treated.

This control program was a cooperative undertaking with the Plains Cotton Growers, Inc., Plant Pest Control Division, Texas A & M University, Texas Department of Agriculture, Entomology Research Division, and the National Cotton Council. Funds were provided on a matching basis, with 50 percent paid by the Plant Pest Control Division and the other 50 percent by the

Plains Cotton Growers, Inc., and the Texas Department of Agriculture. The Plains Cotton Growers, Inc., raised their funds by requesting growers in the 23-county High Plains area to contribute 40 cents per bale. Participation by farmers was excellent; only four farmers, with holdings of less than 150 acres of cotton, refused to cooperate.

Ground trash examinations to determine boll weevil populations in hibernation were started January 10, 1966. Only those properties where ground trash had yielded weevils in January 1965 were included in the 1966 survey. Results of tests, monitoring, and surveys indicate an overall weevil reduction of 99 percent. The plans are to continue a similar program during the fall of 1966, thereby completing the planned 3-year project.

Big Bend

For the past four years efforts have been made, using the diapause method of control, to stop the westward spread of the boll weevil up the Rio Grande Valley to the cotton-producing States to the west. All of the area along the Rio Grande River, from approximately 10 miles south of Ruidosa to a point approximately 50 miles north of the last established infestation, has been treated for four years.

The insecticide used for the first three years of the program was methyl parathion in a water solution. In the fall of 1964, malathion LV concentrate was used.

During the spring and summer months of 1965, considerable thought was given to expanding this program to include the cotton-producing area between Presidio, Texas, and Ojinaga, Chihuahua, Mexico, with the purpose of eradicating the boll weevil population in this isolated area. After an aerial survey was made, it was determined by representatives of Texas A & M University, Entomology Research Division, Plant Pest Control Division, and the Texas Department of Agriculture that this area should be included for treatment. The area treated covered about 300 miles of river valley along the Rio Grande and Rio Conchos Rivers into Mexico. Approximately 119,000 aggregate acres were treated during the eight applications.

From surveys made prior to the beginning of the program and during the program, the results appeared to be highly satisfactory. Trash surveys made by the Entomology Research Division also indicated that the program was very successful. It is hoped that, because of the success of the treatment program, it will be possible to remove from the control program some of the area on the north during the 1966 season.

El Paso

Extensive survey was conducted for the boll weevil in El Paso County throughout the cotton-growing season, with negative results. This is the second season the weevil has not been found in the El Paso Valley.

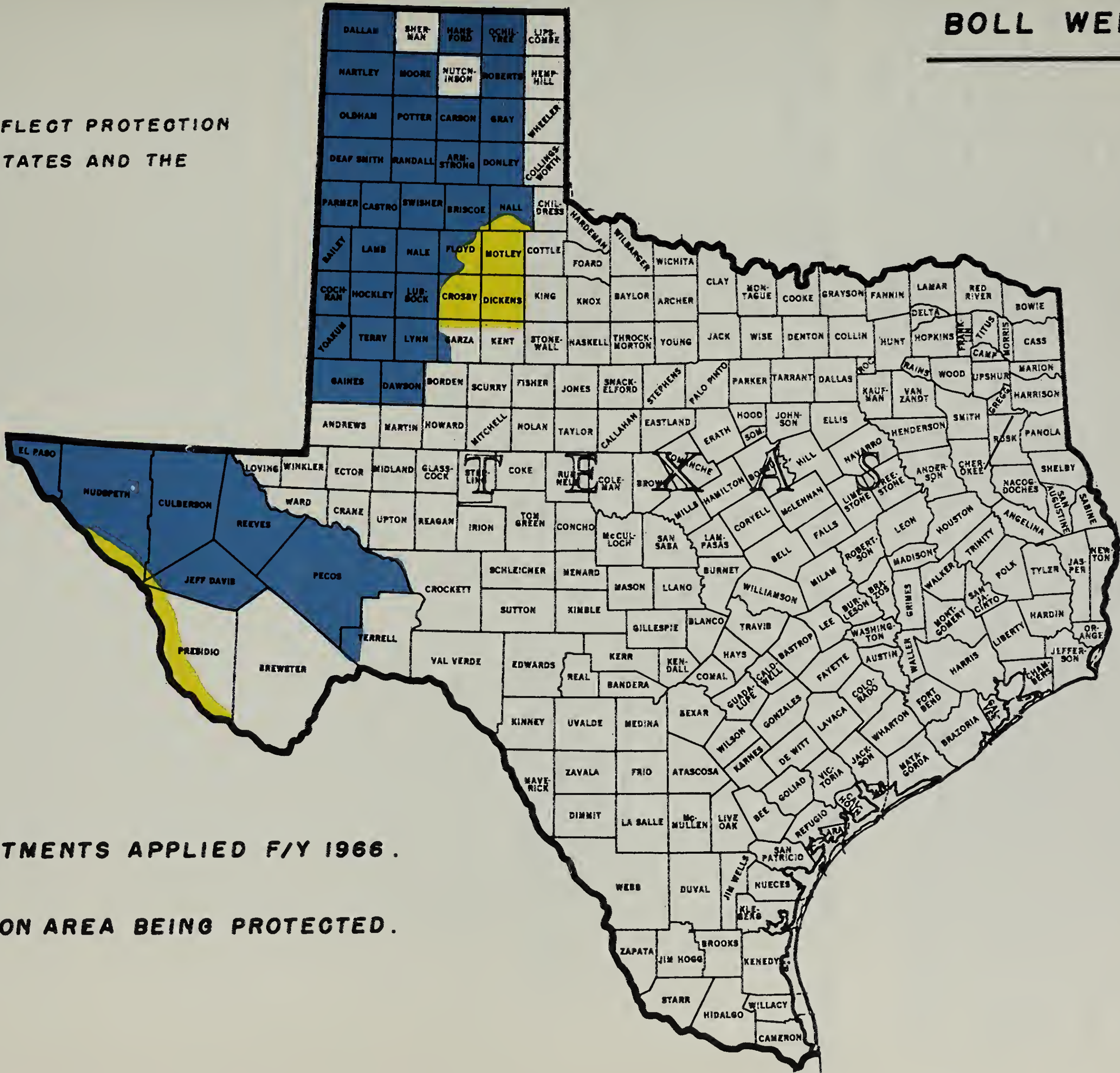
Table 2.--Boll Weevil

State	Survey and detection				Control	
	Surveyed		Infested		Acres treated	
	Properties	Acres	Properties	Acres	Initial	Aggregate
Texas						
Big Bend	510	28,724	8	472	4,666	37,773
High Plains	2,447	142,910	255	15,085	263,707 1/	1,512,548
Total	2,957	171,634	263	15,557	268,373	1,550,321

1/ High Plains surveys are made on transections of 3 miles each. Treatment blocks are formed to include all infestations, intervening areas, and a reasonable periphery.

BOLL WEEVIL

THIS MAP DOES NOT REFLECT PROTECTION AFFORDED TO OTHER STATES AND THE REPULBIC OF MEXICO.



TREATMENTS APPLIED F/Y 1966.

COTTON AREA BEING PROTECTED.

CITRUS BLACKFLY

The Citrus Blackfly Program is primarily a survey operation, as the fly itself has not been found in Texas since the eradication program of 1956. However, because of the proximity of infestations in Mexico and the fact that numerous interceptions of the pest are made by Plant Quarantine Division personnel at the Texas-Mexico border, intensive surveys are conducted each year in areas near ports of entry along the Rio Grande, including the cities of Brownsville in Cameron County, Hidalgo in Hidalgo County, and Laredo in Webb County. A thorough check is made, also, on all properties and environs found infested in Texas in 1955-56, with special attention given to the major citrus-producing areas of Cameron, Dimmit, Hidalgo, and Willacy Counties. In addition, inspections were made this year in areas where citrus is of less economic importance, including Aransas, Bee, Maverick, Refugio, San Patricio, Starr, Webb, Zapata, and Zavala Counties.

During the fiscal year, 20,059 citrus trees on 3,680 properties were inspected, all with negative results.

Table 3.--Citrus Blackfly

State	Survey and detection		Control	Regulatory		
	Hosts		Host plants treated	Inspections		
	Examined	Infested		Packing sheds	Vehicles	Other
Texas	20,059					
Total	20,059					

MEDITERRANEAN FRUIT FLY

The fruit fly detection program in the Southern Region is designed to detect any fruit flies (except the Mexican fruit fly) not known to be present but considered to be of economic importance should they become established in certain sections of this country. These species are melon, Queensland, oriental, Mediterranean, and Natal fruit flies.

Because of ecological conditions, degree of exposure, and economic importance, the fruit fly trapping program is emphasized in south Florida, southeast Louisiana, and the Valley of Texas. A less intensive program is carried on in the remainder of Florida and along the Gulf Coast area of Alabama, Mississippi, Louisiana, and Texas, as well as at points on the eastern seaboard, including Savannah, Georgia, Charleston, South Carolina, and Wilmington, North Carolina.

This was the second consecutive year in which no Medflies were trapped in Florida; however, it was the first year in which the Medfly had ever been found in Texas. On June 13, 1966, a Mediterranean fruit fly was taken from a Steiner trap in Brownsville, Texas, thus proving again the value of the fruit fly trapping program. The trap was in a calamondin tree at 203 NE Levee Street, within a few yards of the International Bridge. Traps have been in use in Brownsville for the past four years; in fact, this particular trap has been at this location since 1962.

Action was begun immediately to increase trap density in the Brownsville area, and the number in use was brought to approximately 1600. Additional traps were placed in the area north of Brownsville to the beginning of the ranch country and across the Rio Grande River in Mexico. Traps were placed, also, along main routes of travel west to El Paso, north to San Antonio, and northeast to Houston.

The first larval infestation was found on June 16, when two larvae were found in a peach. As of June 30, thirty-two separate infestations had been located, all of which are in the city of Brownsville. When this infestation was found, steps were taken immediately by the Texas Department of Agriculture and the Plant Pest Control Division to provide necessary regulatory action to prevent spread and to initiate eradication measures against the infestation. Fortunately, at that time practically no commercial citrus was being shipped. There are some 1500 acres of citrus outside the city of Brownsville that were included in the regulated area.

Difficulties with the low-volume malathion bait formulation delayed the first treatment until June 28 and 29, when LV malathion without the sauce bait attractant was applied at the rate of 2 ounces per acre. Slightly more than 12,000 acres were treated, which provided a protective zone immediately across the Rio Grande in Mexico. In addition to the overall treatment, all infested properties received supplemental treatments, consisting of 25 percent wettable powder malathion and sauce bait mixed with water, applied by ground sprayers.

At the end of June, a full-scale eradication program was under way.

MEXICAN FRUIT FLY

The Mexican fruit fly is a native of Mexico and is capable of causing heavy damage to citrus wherever it becomes established. Damage is caused by the larvae feeding inside the fruit. Because of a wide range of hosts, including those of noncommercial value, the Mexican fruit fly maintains a continuous population in northeast Mexico throughout the year.

The Mexican fruit fly was first found in Texas in 1927. Because of high temperatures and lack of host material, the fly disappears from Texas during the summer months. Each fall and winter Mexican fruit flies migrate from northeast Mexico to the citrus groves in the Rio Grande Valley of southern Texas. Some years the infestations are few and light in intensity while other years they are numerous and heavy. This year there were practically no infestations.

Surveys were conducted as usual this year with the use of McPhail traps baited with the cottonseed protein liquid lure, and by visual inspection of host fruits for possible larval infestations. Traps were placed in use throughout the citrus-producing areas during the early part of September. The trapping pattern was changed this year in order to trap more properties with fewer traps per location. This new pattern included 4 traps per property instead of 20 as was the case with the old rectangular pattern. This provided a much better distribution and all the more suitable citrus groves were trapped. The number of properties trapped during the season was more than three times greater than during the 1965 fiscal year. All traps were removed about the middle of December.

The results of trap inspections were negative this year for the first time since traps have been in use. No adult flies were trapped and only two larval infestations were found. Last year 77 flies were trapped and 16 larval infestations discovered. The first larval finding was on April 26. The other infestation was found during the week of May 7. Both infestations were discovered in Hidalgo County on dooryard plantings. None were detected this year in commercial groves.

Regulatory activities increased considerably this year. The 1965-66 citrus season officially opened on September 13, with harvesting and shipping well under way by October 1. The 1965-66 citrus crop for Texas amounted to a little over five million boxes, which was almost four times more than the year before. Harvesting and shipping were still under way at the close of the fiscal year, June 30, 1966.

Because of a change in the quarantine it was necessary to issue new dealer-carrier agreements with revised stipulations to all citrus shippers with fumigation facilities. The revised stipulations included the newly added restricted areas in Plaquemines Parish, Louisiana, and those of Hawaii, Puerto Rico, Guam, and the Virgin Islands.

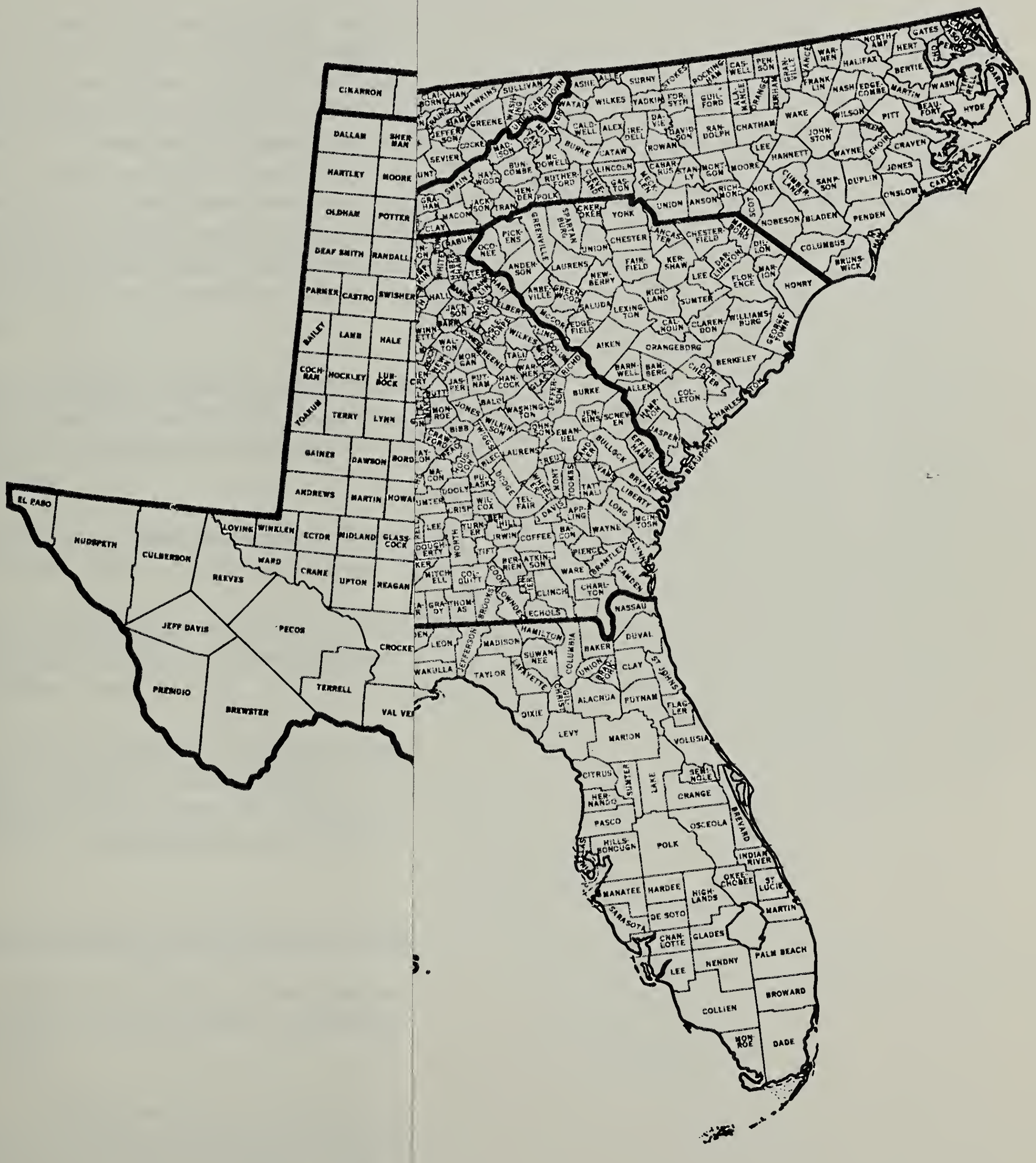
During the season 760 fumigations were supervised in the treatment of 578,832 units of citrus, and 1,684 master certificates were issued for shipments to restricted areas.

Table 4.--Mexican Fruit Fly

State	Survey and detection			Control		Regulatory			
	Traps installed	Infested		Chemical	Biological	Commodity treatments (visits)	Properties inspected 1/		
		Properties	Acres	Acres treated	Flies released (units 1,000)		Nurseries	Processing plants	Other
Fla.	550	...	...			...	...	...	...
Texas	1,744	2	21			781	3	2,745	4,099
Total	2,294	2	21			781	3	2,745	4,099

1/ These figures represent "visits."

DIVISION



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USDA - ARS - PPC

Table 4.--Mexican Fruit Fly

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Fla.	550	...	...			...	...	...	...
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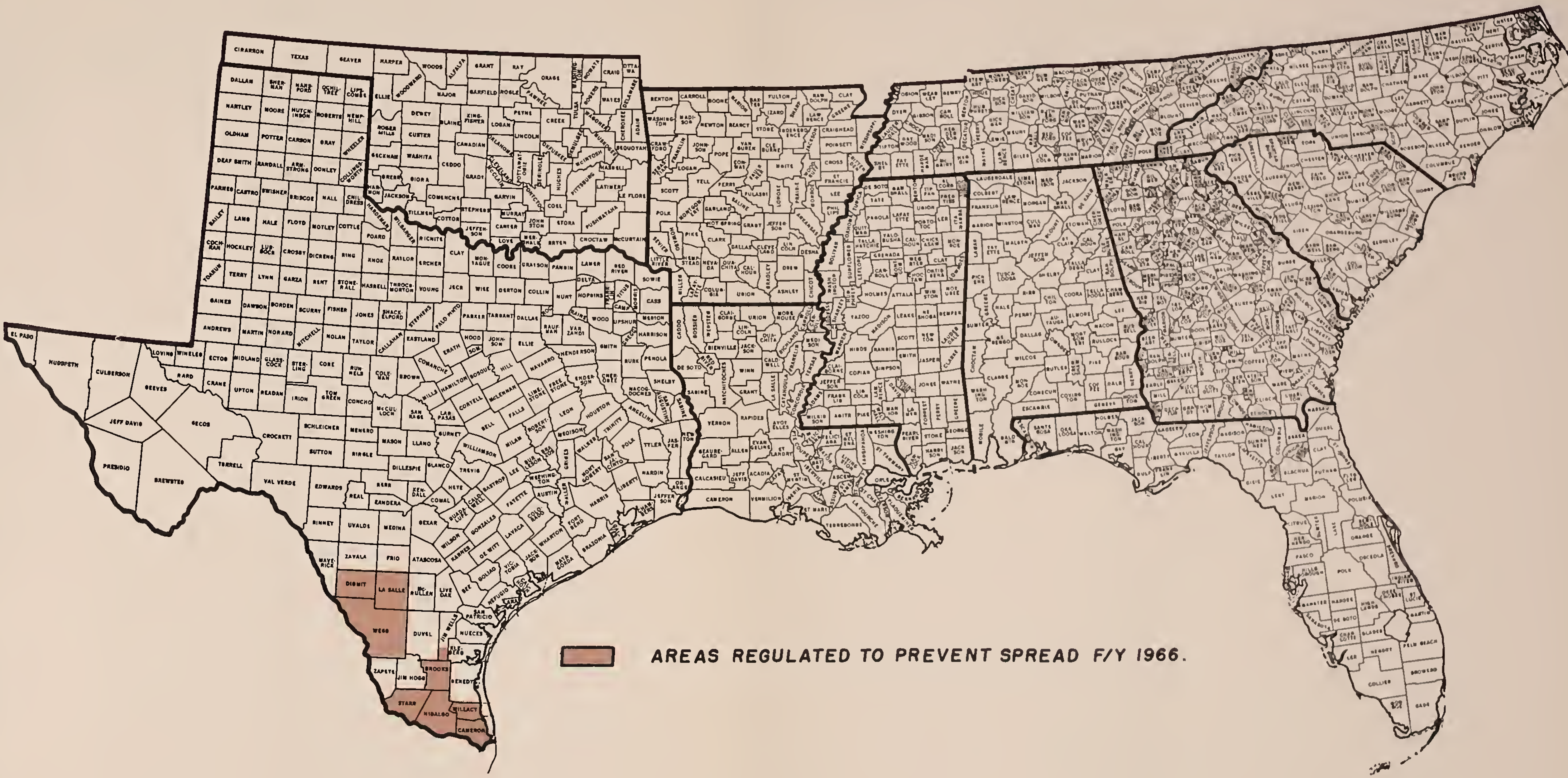
UNITED STATES DEPARTMENT OF AGRICULTURE

AGRICULTURAL RESEARCH SERVICE — PLANT PEST CONTROL DIVISION

SOUTHERN REGION

MEXICAN FRUIT FLY



USDA - ARS - PPO

COOPERATIVE ECONOMIC INSECT SURVEY AND DETECTION

In Alabama, Arkansas, Florida, North Carolina, Oklahoma, and Texas, the Cooperative Economic Insect Survey and Detection Program was operated under agreement and with full-time survey entomologists; in Mississippi, the program operated under modified agreement. Two personnel changes occurred during the year: Mr. Reed L. Dinkins was appointed as survey entomologist in Mississippi, and Mr. Freddie W. Parker replaced Mr. M. V. Meisch as survey entomologist in Texas.

One or more contacts were made with each of the State survey coordinators during the year. Efforts were made to improve the insect reports being submitted from each of the States. Contacts also were made with the survey entomologist in each of the States having cooperative agreements. As a result of Advisory Committee meetings in Arkansas, Florida, and Oklahoma, work plans were reviewed and rewritten to reflect minor changes. The Advisory Committee in Alabama met during April 1966 to discuss the survey work and revision of the work plan; however, the revised work plan had not been received at the close of the fiscal year. In some instances, the State survey coordinator or members of the Advisory Committees have changed during the year.

Weekly insect reports were submitted by States having survey entomologists; other States submitted reports during the active insect season. Other agricultural agencies continued to cooperate by submitting information for these reports.

Insect detection workshops were held during the year in Alabama, North Carolina, and South Carolina.

Annual summaries of insect conditions were received from all States having full-time survey entomologists, and loss estimates were submitted by Arkansas, Oklahoma, and Texas.

Fall and spring hibernation surveys on boll weevil again were made in several other States of the Region. In cooperation with other agencies in some areas, emphasis was given to insects such as Southwestern corn borer and alfalfa weevil to determine their distribution and spread.

Beet Leafhopper and Potato Psyllid (Texas and New Mexico 1966)

The annual survey to determine beet leafhopper and potato psyllid populations, as well as host plant abundance and distribution, was made in Texas and New Mexico.

Beet leafhopper survey stops were made at 20-mile intervals on designated routes through Texas and New Mexico. The survey began February 28 and was completed March 9, 1966. Two teams of two inspectors each participated in the survey. The San Angelo-based team worked the south area, and the team from Lubbock surveyed the northern portion of the route.

Host plants were found to be less abundant, in poor stands, and in poor to fair condition throughout the entire survey, in comparison with the 1965 survey. The beet leafhopper population counts were found at the rate of eight per 100 square feet of hosts, compared to eleven per 100 square feet in 1965.

Two areas were surveyed for potato psyllid. In the section comprising Big Spring, San Angelo, Del Rio, and Sanderson the *Lycium* was extremely late in leafing out and the survey revealed a smaller population than in previous years. *Lycium* in the El Paso-Las Cruces area, also, was late but was more uniform and in better condition. Population counts more than doubled in the El Paso section and increased tenfold in the Las Cruces section over those found the previous year. Eggs were scarce in all areas except the El Paso section, where they were readily found.

Cereal Leaf Beetle

Detection-type surveys were conducted in the principal grain-producing areas in Arkansas, Louisiana, Oklahoma, Tennessee, and Texas. Both visual observations and sweep nets were used. Emphasis was given to locations where mechanical introduction would most likely occur, such as railroad cars, grain elevators, etc.

Regulatory inspections were made at horseracing establishments in Arkansas, Louisiana, and Florida to determine source of supply of feed and bedding for the animals. Also, hay and grain dealers who might purchase hay and feed products in the infested area were contacted. All surveys were negative for cereal leaf beetle.

Table 5.--Cereal Leaf Beetle

State	Survey and detection		Control	Regulatory		
					Commodity treatments	
	Surveyed No. stops	Acres surveyed	Acres treated	Properties inspected	Hay, straw (tons)	Small grains (bu.)
Arkansas	431	16,620		...		
Florida	26	3,857		...		
Louisiana	...	...		2		
North Carolina	79	531		...		
Oklahoma	225	9,424		...		
Tennessee	53	1,000		...		
Total	814	31,432		2		

Cuban May Beetle

Minor extensions of the Cuban May beetle infestation were found. However, so far as is known the beetle is confined to Dade County. It did heavy damage to several species of plants in the Kendall area of Dade County where 25,000 adult beetles were taken from one black light trap. Research on the biology and control of the insect is being conducted under an Entomology Research grant, but no report has been issued to date.

A Fruit Fly (Florida)

In April 1965, larvae of a fruit fly, *Anastrepha suspensa*, were found infesting Surinam-cherry at a private residence in Miami Springs, Dade County, Florida. Soon thereafter, adults were trapped; and by the end of June the area of infestation had expanded to include 252 infested properties and populations had reached explosive proportions. On July 15, 1966, a meeting was held in Miami, attended by personnel of the Division of Plant Industry, Florida Department of Agriculture; Agricultural Research Service, USDA; and the University of Florida. As a result of this meeting, a four-point program was formulated, as follows:

1. Large-scale spray tests. Tests were conducted on a 2,000-acre block to compare technical malathion at 2, 4, and 6 ounces per acre with a standard bait spray, using wettable malathion and SIB No. 7. These tests were not replicated in this area but were followed on another 2,000-acre block, using 2 ounces of technical malathion per acre replicated five times. These tests confirmed that the 2-ounce rate of technical malathion would control the flies.

2. Trapping and lure tests. Tests were conducted using several different lures with various types of traps. The McPhail traps baited with cottonseed protein gave the best results. However, sticky boards baited with Hy Case were highly effective and cheaper to purchase and operate. The color of the sticky board traps did not seem to make any difference in the number of flies trapped.

3. Mass rearing and sterility. Sterility studies conducted by Entomology Research personnel indicate that the fruit fly *A. suspensa* can be successfully sterilized with Cobalt 60. Sufficient information has been gathered to initiate a sterile release program if such is determined necessary. A colony of flies has been reared and is being maintained for possible use in an eradication program. The flies are producing approximately 2,000 eggs per day. Production could be expanded to 200,000 within a period of two to three months by utilizing previously proven mass production procedures. One of the major problems encountered has been the low percentage of egg hatch. However, the percentage has slowly risen and is now more than 55 percent.

4. Continuous surveillance. *A. suspensa* has been kept under continued surveillance this year by the use of McPhail, Steiner, and sticky board traps and by cutting of fruit for larval survey. The fly populations

dropped during the winter; however, they built up rapidly this spring, exceeding those of last spring and summer. In the Miami area of Dade County where populations are the heaviest, more than 7,800 flies were trapped the last week in May with only a few traps being operated.

The flies now have spread into 10 counties, with the northern boundary extending to Brevard County on the east coast and Lee County on the west coast. The host list has continued to expand and now includes grapefruit and mango; however, the preferred hosts appear to be Surinam-cherry and guava.

Golden Nematode

Very little survey was done for golden nematode during the year. In performing surveys for other nematodes, inspectors are constantly on the alert for golden nematode.

Gypsy Moth

Some gypsy moth survey was conducted in Alabama, Arkansas, Florida, North Carolina, and Tennessee for the presence of this pest. As no lure was available for traps, most of the survey consisted of checking some of the points of most likely introduction, such as parks, trailer courts, campgrounds, etc.

Hoja Blanca

Incidental surveys were made in the principal rice-growing areas of Arkansas, Louisiana, and Texas for symptoms of hoja blanca disease of rice and the vector *Sogata orizicola*. The small amount of rice grown in Palm Beach and Hendry Counties, Florida, also was surveyed. All surveys were negative as to the disease or vector.

Table 6.--Hoja Blanca

State	Survey and detection				Control	
	Surveyed		Found infested		Insecticide	
					Treated by air	
	Properties	Acres	Properties	Acres	Properties	Acres
Arkansas	122	8,802				
Total	122	8,802				

Termites

On July 2, 1965, specimens from a warehouse at Todd Shipyards in Houston, Texas, were officially identified as *Coptotermes formosanus* Shiraki, a subterranean termite. On May 21 and 24, 1966, the Bennett Pest Control Company and Collins Pest Control Association, respectively, collected specimens in West Lake, Louisiana, which were identified as *C. formosanus* by Frances M. Weesner at Fort Collins, Colorado. On May 30, 1966, Orkin Pest Control received a positive identification on specimens collected from two locations in New Orleans. Specimens which were officially identified as *C. formosanus* were collected from each of these locations.

As a result of these finds, an organized survey was started in each of these locations, and personnel from other States were brought into New Orleans for training. Plant Quarantine personnel assisted in making these surveys at principal ports of entry in the Southern Region. Through the combined efforts of the LSU Department of Entomology, Louisiana Department of Agriculture, and Plant Quarantine and Plant Pest Control Divisions, it was determined that infestation occurred over approximately a 12-mile area in New Orleans and a lesser area in Lake Charles, Louisiana, and vicinity. The area in New Orleans was centered around old Camp Leroy Johnson and the Industrial Canal on the eastern edge of the city. Additional infestations were found on the west side of the Mississippi River at Todd Shipyards and the U. S. Naval Base. The area at Lake Charles was along the banks of the Calcasieu River, and logs and stumps as well as commercial buildings and residences were found infested. Inspections in Florida, Georgia, North Carolina, South Carolina, Alabama, and Mississippi were negative.

The warehouse at Todd Shipyards in Houston was fumigated with methyl bromide at the rate of 4 pounds per 1,000 cubic feet. Inspections of the fumigated warehouse in June 1966 were negative; but two additional infestations were found, one in a pumphouse just back of the warehouse and the other on an adjacent property. An infestation was found, also, at Todd Shipyards in Galveston.

The swarming period is a good time to survey for the Formosan termite. Numerous wings will be found caught in spiderwebs in and near infested buildings. These wings provide positive characteristics for identification.

Infestation of Coptotermes formosanus Shiraki. Note extreme damage to all areas of attack.

Soldiers of Coptotermes formosanus Shiraki can be told from the common dry wood termites by the presence of an extremely large fontanelle, or opening in the head.

DETERMINATION OF IMPACT OF AGRICULTURAL PESTICIDES ON FARMLAND

The program to determine the effects of pesticides in a typical farm operation continued during fiscal year 1966.

The 1965 sampling season extended from January 1965 to December 1965, and the 1966 sampling season will extend from January 1966 through December 1966.

On July 1, 1965, four 640-acre sites were under study in Alabama, Arkansas, and Mississippi. Schedules and sampling patterns established after the 1964 season's operations were utilized without modification.

Intensive pretreatment and posttreatment sampling was carried out on soils and certain species of indigenous wildlife.

The soil-sampling system employed a grid pattern and also resulted in triplicate samples, each a composite of one core from every acre in the block. The uniformity of results obtained was much greater than previously. Collection of wildlife samples relied heavily on trapping of cottontail and swamp rabbits, cotton rats, white-footed mice, voles, house mice, squirrels, and some opossums and chipmunks. Samples were composited and analyzed for comparison of residues according to age and sex.

Intensive summer-long studies were made on aquatic life in farm ponds, and on selected land arthropods and bees and their environment. Aquatic studies included collection and analysis of plankton, tadpoles, top minnows, bluegill, shell cracker, bass, gar, catfish, crayfish, mussels, and turtles. Measurement of residues throughout the summer and comparison of residues in samples from different ponds were made. Trapping of spiders, ground beetles, and crickets in pitfall traps was carried out in both high and low treatment blocks to compare population trends. Apiary studies included collection and analysis of pollen, beebread, royal jelly, honey, wax, mature and immature bees of all castes, and certain pollen-producing plants.

Major crops grown on the study sites and sampled at harvest were cotton, soybeans, sorghum, corn, rice and other small grains, potatoes, cabbage, melons, and forage. Emphasis was directed toward determining whether or not these crops take up pesticide at the concentrations found in the soil and whether the pesticides are absorbed through plant tissue as a result of direct foliage application.

Analysis of 6,614 samples from the 1965 season's work was 80 percent complete at the end of June 1966. In addition, a third of the 2,234 samples from the 1966 season's work was complete on that date.

Special soil-study sites, which included high, low, and nonpesticide use areas, were established at 16 different locations in 7 Southern States. Soil samples have been collected from all sites.

Laboratory personnel collaborated in the writing of a chemical laboratory manual, explaining all of the procedures followed on the DIAP Program. The manual is for use throughout ARS in residue monitoring studies.

This soil-sampling device developed by Methods Improvement and DIAP field personnel replaces two men at each site, insures uniformity of samples, and reduces collection time 75 percent. The machine is used in each 640-acre study area and collects 40,000 soil cores annually.

GRASSHOPPER

Biological conditions were favorable for grasshopper development this year in western Oklahoma and in the Panhandle of Texas. Infestations of light to moderate classification were found in western Arkansas and in Gonzales and Karnes Counties in east Texas. Farmer control protected crops in Arkansas and east Texas.

PPC Division help was needed by farmers in ten counties of the Texas Panhandle: Armstrong, Briscoe, Floyd, Gray, Hansford, Lipscomb, Ochiltree, Donley, Collingsworth, and Wheeler. A cooperative control program was carried out, also, in Kiowa County, Oklahoma.

Aerial applications of technical malathion (LV) at the rate of 8 fluid ounces per acre gave good to excellent grasshopper control, with existing populations reduced by 80 to 95 percent.

Table 7.--Grasshopper Control

State	Survey and detection		Control
	Surveyed (No. stops)	Acres infested	Acres treated
Arkansas	67	...	...
Oklahoma	2,370	249,000	...
Texas	1,759	123,280	96,312
Total	4,196	372,280	96,312

IMPORTED FIRE ANT

Growing support, both public and private, for the Imported Fire Ant Program is reflected by the increasing number of acres treated yearly since 1962. There were 974,104 acres treated in 1962; 1,857,994 in 1963; 2,347,681 in 1964; 4,016,840 in 1965; and 6,294,541 in 1966. The program has benefited again this year from improved methods of application and greater cooperation from States and counties in providing materials and personnel.

In Alabama, survey, control, and regulatory operations were continued and intensified. Primary consideration and emphasis were given to peripheral and fringe areas, where an expanded and progressive program was conducted.

Most of the work in Arkansas was concentrated in the southern and southeastern counties, but surveys were conducted throughout the State. Small infestations were found in Ashley, Chicot, and Union Counties. These are believed to be spillover infestations from Louisiana, as they are, for the most part, in the immediate vicinity of the State line. All of these infestations, totaling some 26,250 acres, were treated before the end of the year.

Infestations in Florida were found for the first time in 79 townships in 24 counties; only 3 of these counties, Jefferson, Osceola, and Citrus, were not previously known to be infested. Several airplane contracts were carried out in the State during the year. The largest involved some 450,000 acres in the Orlando area, including parts of Lake, Orange, Seminole, and Volusia Counties. Regulatory work consumes a large part of the Florida inspectors' time. This year, more than 300 nurseries were either treated for the first time or re-treated. During the year, some 200 applications were made for the certification of hay, much of which is used as mulch along highway rights-of-way outside the infested area.

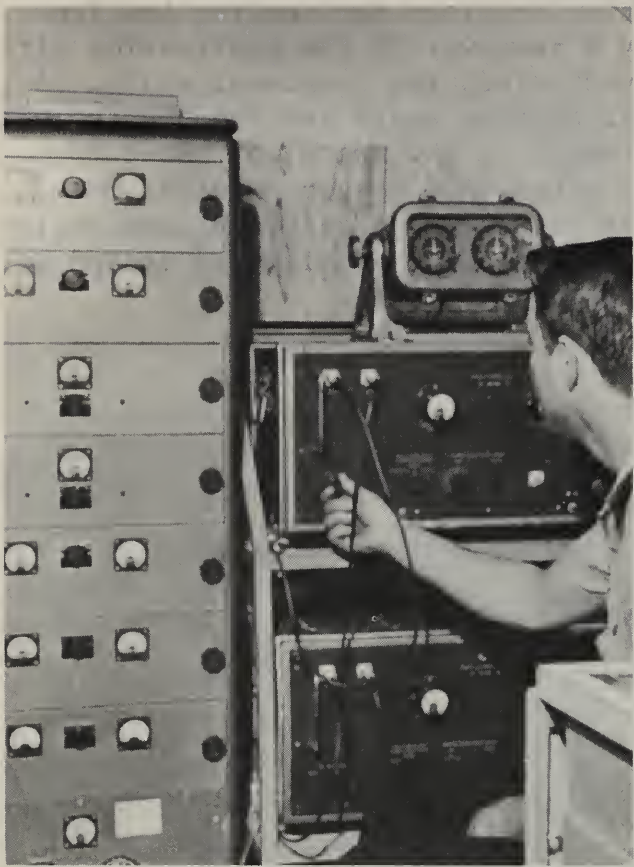
In Georgia, slightly less than 2 1/4 million aggregate acres were treated, and results appear to be good. The Georgia Department of Agriculture early this year inaugurated a new program of surveillance over treated areas that puts responsibility on the property owner. When a county has been treated, oil-proof bags, printed with instructions for the use of mirex bait and holding about three pounds of the bait, are made available to the property owners, without cost to them. These are provided through their County Farm Bureau office and the office of the county agent so that they may treat any incipient mound they find on their properties. In order to know who has ants surviving, a record is kept of those who pick up the bait. Preliminary results indicate this system is quite worthwhile.

There has been no major change in infested status of areas in Louisiana. Claiborne Parish is still the only parish that has had no infestation since the beginning of the program. The Louisiana Department of Agriculture provided mirex bait at factory cost to growers in the generally infested area, who purchased approximately 600,000 pounds for use in treating their properties.

A new guidance system for aerial application was tested in the Alexandria, Louisiana, treatment program this spring. The system, furnished by Decca

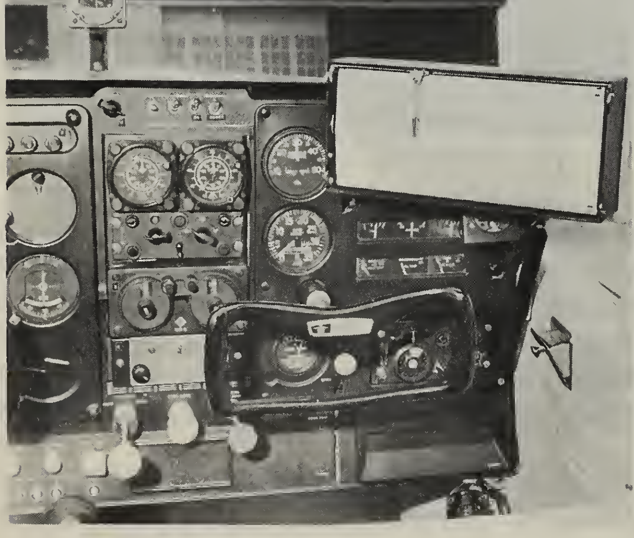
Navigator System, Inc., provided transmitting stations for sending low frequency radio waves, which were computed by a receiver in the application aircraft to reflect the location of the aircraft along the treatment swath. A recorder in the aircraft charted the flight on each swath and the opening and closing of the hopper gate. The average length of the swath was about 25 miles, and no markers were required. This electronic system provides more accuracy in application and greatly reduces the need for personnel and equipment. The disadvantages noted were pilot fatigue and interference caused by static electricity from weather disturbances.

This is one of three stations required for proper operation of the electronic guidance system used in providing electronic beams for proper spacing of aircraft. This system includes a full-time radio technician, two 6,000-watt diesel-powered generators, and receivers and computers mounted in a trailer equipped for living quarters. The two 20-foot antennae receive the signal. The low frequency radio signal is transmitted from the 120-foot antenna to the receiver in the treating aircraft.



The picture on the left shows the Decca technician with phase control and transmitter unit located in the trailer.

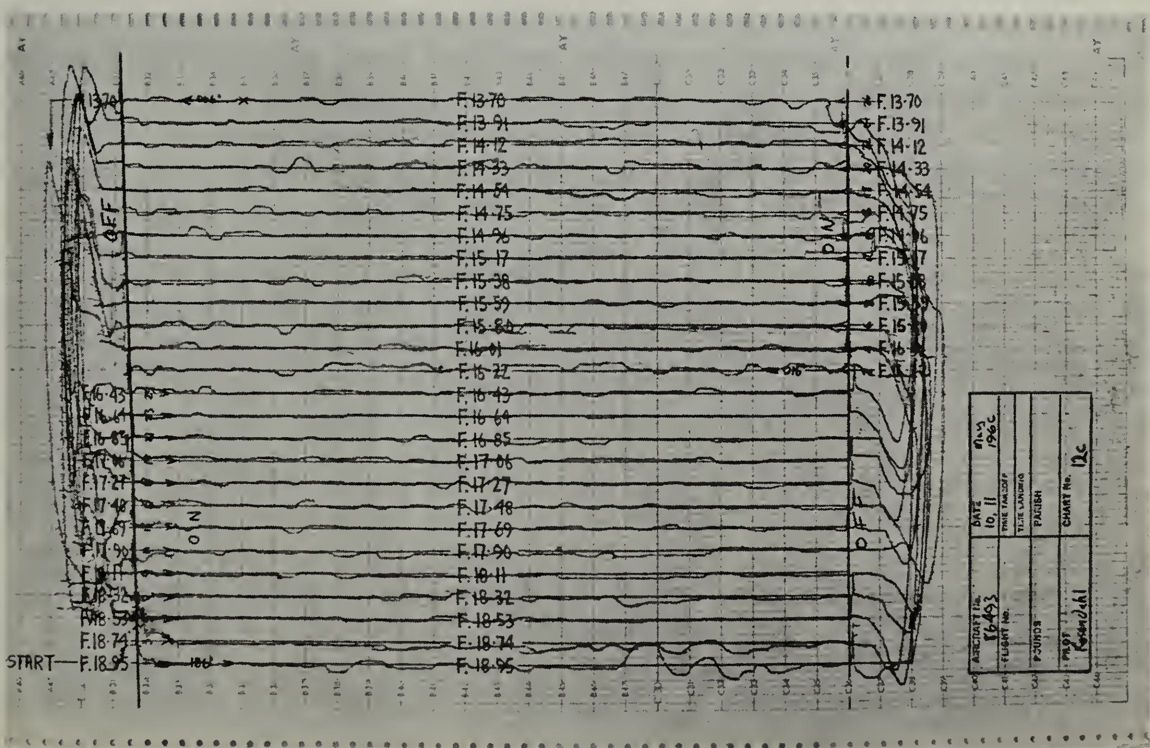
The base monitoring station with recording chart determines the stability of the beam from the ground station.



At left, Decca equipment in aircraft, showing the left-right indicator (top left circle). The needle should be centered for maximum accuracy. The course of aircraft is recorded on flight log chart at upper right.

On the left, the chartographer is preparing tracking charts for guidance of aircraft for predetermined swath spacing. Right portion of chart is for use in guiding treatment aircraft from airport to treating area.

The picture below shows recorded flight lines of application aircraft and "Start and Stop Event" marks.



In Mississippi, infestations were found for the first time in Grenada and Tallahatchie Counties. Of the 82 counties in the State, 65 now have been found infested. More than half a million acres were surveyed in counties where eradication programs are either under way or in preparation. In the control phase of the program, almost a million aggregate acres were treated by air. Treatments are being made along the outer fringes of the general infestation, and most of the work is being done in the northeastern part of the State where it is hoped that the northward march of the fire ant can be stopped. Some treatments were made in counties in the interior of the generally infested area, including Covington, Hinds, Jefferson Davis, and Pike, which have been cooperating with the program since the early days of operation. Thus far, perhaps the most successful eradication attempt made in Mississippi has been the one in Washington County. This county has remained free of infestation since it was treated several years ago. Movement of construction equipment continued to be a regulatory problem during the construction phase of the Space Flight Center in Hancock County, particularly following completion of the use of dirt-moving equipment. Certification problems there necessitated assignment of one man almost full time for a short period to check on movement of that equipment. Nurseries were kept informed of the need for treatment or re-treatment by means of soil bioassay and by the regular time elapse system.

In North Carolina, extensive surveys were conducted in Brunswick, Carteret, Craven, Onslow, and Pamlico Counties to determine the limits of old infestations and to serve as an appraisal for ground treatments which were applied in the past. These surveys revealed minor extensions in all of these counties except Craven County and showed that areas, adjacent to initial infestations, that had been spot-treated with ground equipment would require considerably more treatment. This resulted in 170,977 acres being declared infested. The second application of a planned two-application aerial treatment was made to 55,000 acres in Carteret, Craven, and Pamlico Counties. The initial treatment was applied in the spring of fiscal year 1965. Appraisal surveys conducted since the second application have shown that the treatment was very effective. In Onslow County, it was found that spot treatments applied since 1958 by ground equipment had not held up; and in April and May, the first application of a planned two-application treatment was made to 133,625 acres. Smaller areas also received the first application in Brunswick, Carteret, and Pamlico Counties, where minor extensions were found.

Imported fire ant detection surveys in Oklahoma were concentrated in the east-central, southeastern, and southern counties of the State because of the proximity of known areas of infestation in Arkansas, Louisiana, and Texas. Surveys were made, also, in Oklahoma City and Tulsa, the State's two largest metropolitan areas. All surveys have been negative.

Survey was conducted in most of the counties in South Carolina, with no new county finds. Surveys within infested counties to determine the limits of infestation were conducted principally in Aiken, Horry, Lexington, and Richland Counties. Extensions to previously known infestations amounted to more than 128,000 acres, most of this being in Horry County. Only limited survey was done in counties with large infestations, but it will be necessary to conduct surveys to determine the limits of infestation in these areas prior to

any control work. Control treatments were carried out in nine counties on approximately 36,000 acres. All known infestations in Aiken, Lexington, and Richland Counties were treated. In several counties, road shoulders, power lines, railroad rights-of-way, and other avenues of spread were treated by aerial application in an attempt to contain the infestation until further control and eradication measures can be applied.

In Tennessee, imported fire ant inspections were made in 91 counties on about 28,000 properties, involving 138,185 acres. Another year has passed without finding imported fire ants in this State. With infestations relatively close in Alabama and Mississippi, we are pleased that the pest is not yet established in Tennessee.

Imported fire ant infestations in Texas are located in the Houston and Waco Districts. The Harlingen and Lubbock Districts, aware of the possible spread of the pest, conducted detection surveys but results were negative. Emphasis was placed on the inspection of properties located in counties adjoining infested counties and the inspection of nurseries in nonregulated counties. Extensions to the infestation were found in most of the infested counties, and the pest was found for the first time in Collin, Denton, San Augustine, and Waller Counties. Slightly more than 165,000 acres were treated during the year, of which approximately 62,500 acres were initial treatment and the remainder re-treatment. Requests were received for an organized program in Polk County, but a Federal-State cooperative program was impossible, mainly because of the vast holdings in the county by the large lumber concerns which restricted block size. However, a program was initiated whereby the landowners have access to mirex bait at factory cost through the county government, and some 24,000 pounds were purchased. Because of their isolation, it was decided to treat the infestations in Dallas and Gregg Counties in cooperation with the Texas Department of Agriculture and the counties involved. At the close of the fiscal year, 38,000 acres in Gregg County had been treated with the first of a planned dual application. Regulatory duties have been much heavier than in the past. Considerable time was devoted to the inspection, treatment, and certification of nursery stock, potting soil, and earth-moving equipment. Contractors and soil laboratories were placed under compliance agreements.

In the imported fire ant methods improvement program, it has been necessary to recruit and train a new staff to replace personnel losses that occurred as a result of insecurity from budgetary action last year.

A uniform method has been developed for evaluating control and eradication treatments. This method can be used as a standard in all States infested with the imported fire ant, and it will reduce considerably the man-hours expended for surveys following treatment. Also, a uniform method to measure distribution of bait applied by aircraft was developed and is in use in all the infested States.

A substitute carrier for mirex-soybean oil bait has been mound-tested with dyed bait for acceptability and used in small field-plot tests. The new carrier will absorb 66 percent more soybean oil than the present corncob grits. Laboratory and small field-plot tests indicate a progressively faster kill as the soybean oil content is increased. The new carrier is a by-product

from the manufacture of furfural acid, and corncobs are used in the manufacture of the furfural acid.

Another substitute carrier for bait, now in the process of formulation by the Masonite Corporation, is made from woodpulp. It will absorb 166 percent more soybean oil than the present formulation and retain excellent flowability.

A sample of encapsulated bait is being prepared by the National Cash Register Company. It is believed that the bait can be encapsulated and timed for release at any given period. The advantage from such a formulation would be that a single application treatment could be made, in which one-half of the bait would be available immediately and the remainder at a predetermined later date.

The largest collection of imported fire ants in the world. The 350 pounds of ants represent collections from 3,500 mounds. The collection was made by the Methods Improvement Laboratory and shipped frozen to the Pesticide Chemicals Research Branch, Beltsville, Maryland. They are used in an effort to isolate and identify the trail-finding substance pheromone laid down by ants to relocate food. Extracts prepared from the ants are then shipped to Gulfport for bioassay. There were 154 natural and 55 synthetic extracts received, which required 3,768 tests.

Bioassay tests. The sensitivity of candidate trail-following extracts is determined by counting for one minute the number of ants crossing the applicator stick from a source of food, usually ground fried chicken.

The scars from the sting of imported fire ants may be permanent or semi-permanent. The picture shown above was made in mid-April, soon after the boy was stung. The picture shown below was made in early September, some 4 1/2 months later.

Table 8.--Imported Fire Ant

State	Survey and detection		Control		
			Acres treated		
			Organized blocks		Farmer treatments
	Sites surveyed	Acres infested	Ground	Air	
Alabama	25,428	496,994	57,272	236,940	23,200
Arkansas	11,854	26,250	5	61,900	...
Florida	13,925	1,412,124	743	960,414	4,445
Georgia	14,603	669,501	1,732	2,038,050	...
Louisiana	12,632	608,622	4,198	1,331,307	138,354
Mississippi	14,478	735,363	22,517	941,284	...
North Carolina	28,825	170,976	60	232,603	...
Oklahoma	242	...	...	...	...
South Carolina	11,813	128,111	7,916	28,509	...
Tennessee	27,897	...	...	...	...
Texas	31,186	333,645	785	202,307	...
Total	192,883	4,581,586	95,228	6,033,314	165,999

Table 9.--Imported Fire Ant

State	Regulatory					
	Commodity treatments (visits)	Properties inspected1/			Pesticide treatments	
					Soil	
		Nursery	Industrial	Other	Acres	Cu. ft.
Alabama	7	932	377	857	13,609	...
Arkansas	...	6	...	...	...	...
Florida	...	1,586	137	497	3,834	...
Georgia	55	586	173	106	767	14,762
Louisiana	63	1,795	204	156	1,082	261
Mississippi	66	371	584	114	780	3,101
South Carolina	...	7	32	16	17	...
Tennessee	...	...	...	1	...	...
Texas	13	1,084	572	12	448	...
Total	204	6,367	2,079	1,759	20,537	18,124

1/ These figures represent "visits."

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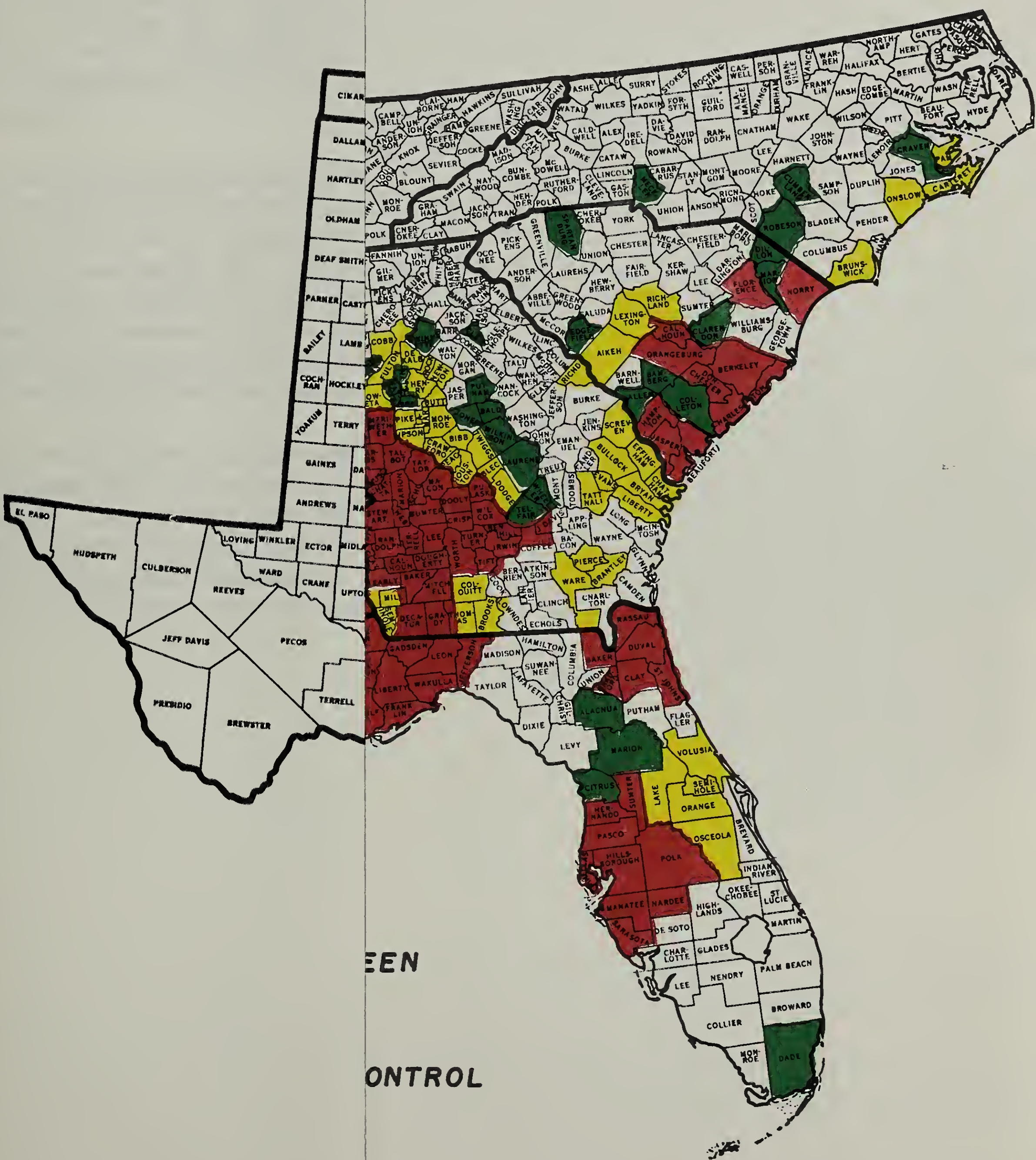

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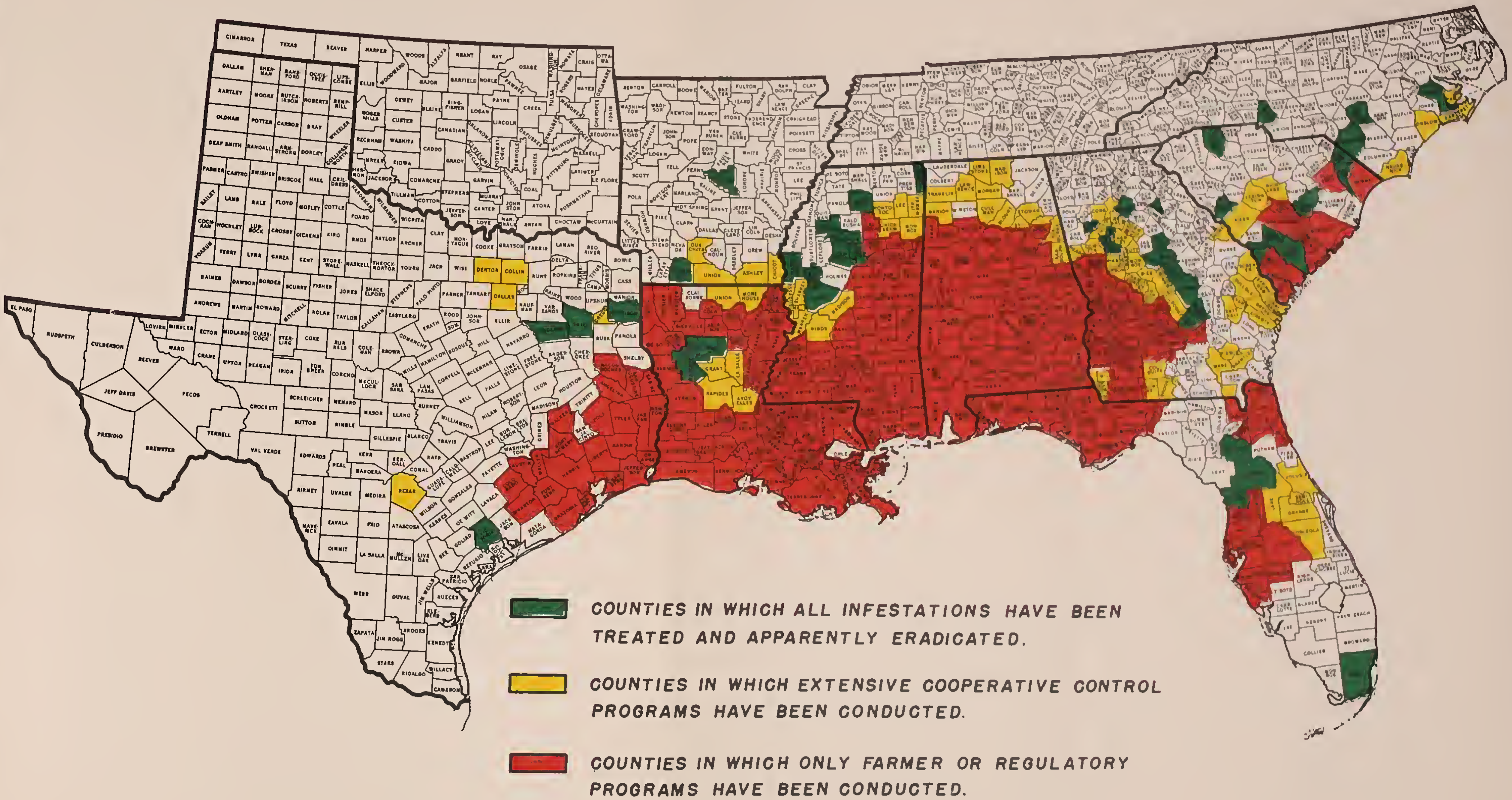
UNITED STATES DEPARTMENT OF AGRICULTURE

AGRICULTURAL RESEARCH SERVICE — PLANT PEST CONTROL DIVISION

SOUTHERN REGION

IMPORTED FIRE ANT



USDA-ARS-PPC

JAPANESE BEETLE

The Japanese Beetle Program in the Southern Region is a containment effort to prevent spread of the beetles to noninfested areas. This is accomplished by operation of strict regulatory procedures and, in some States, by treating critical infested sites to prevent a buildup in population. There were 6,655 acres treated chemically this year.

Japanese beetle traps were operated at major transportation terminals and at tourist attraction sites, such as parks and summer resorts, throughout the area. During the adult season, 5,718 traps were operated. Several adult beetles were collected in Jefferson County, Alabama, from traps located at the Birmingham Municipal Airport and in the Southern Railroad Yards at Irondale.

The Methods Improvement Sections of the Division and the Region have been cooperating with the Entomology Research Division in releasing parasites, applying low-volume malathion with aircraft and ground equipment, releasing sterile males, assessing the results of past seasons' applications of milky disease spore dust applied with ground and aircraft equipment, and field-testing disposable Japanese beetle traps and substitute lures. Entomology Research and Plant Pest Control Divisions are evaluating their findings, but they have not released information on their conclusions.

The restriction on the use of chemicals with persistent residue on pasture and farmland has increased interest in a cooperative effort to develop biological methods for control of this important agricultural pest. We are prepared to participate in the development of alternate means of control; and if an effective biological method is developed, we do not expect any difficulty in obtaining State and municipal support.

Table 10.--Japanese Beetle

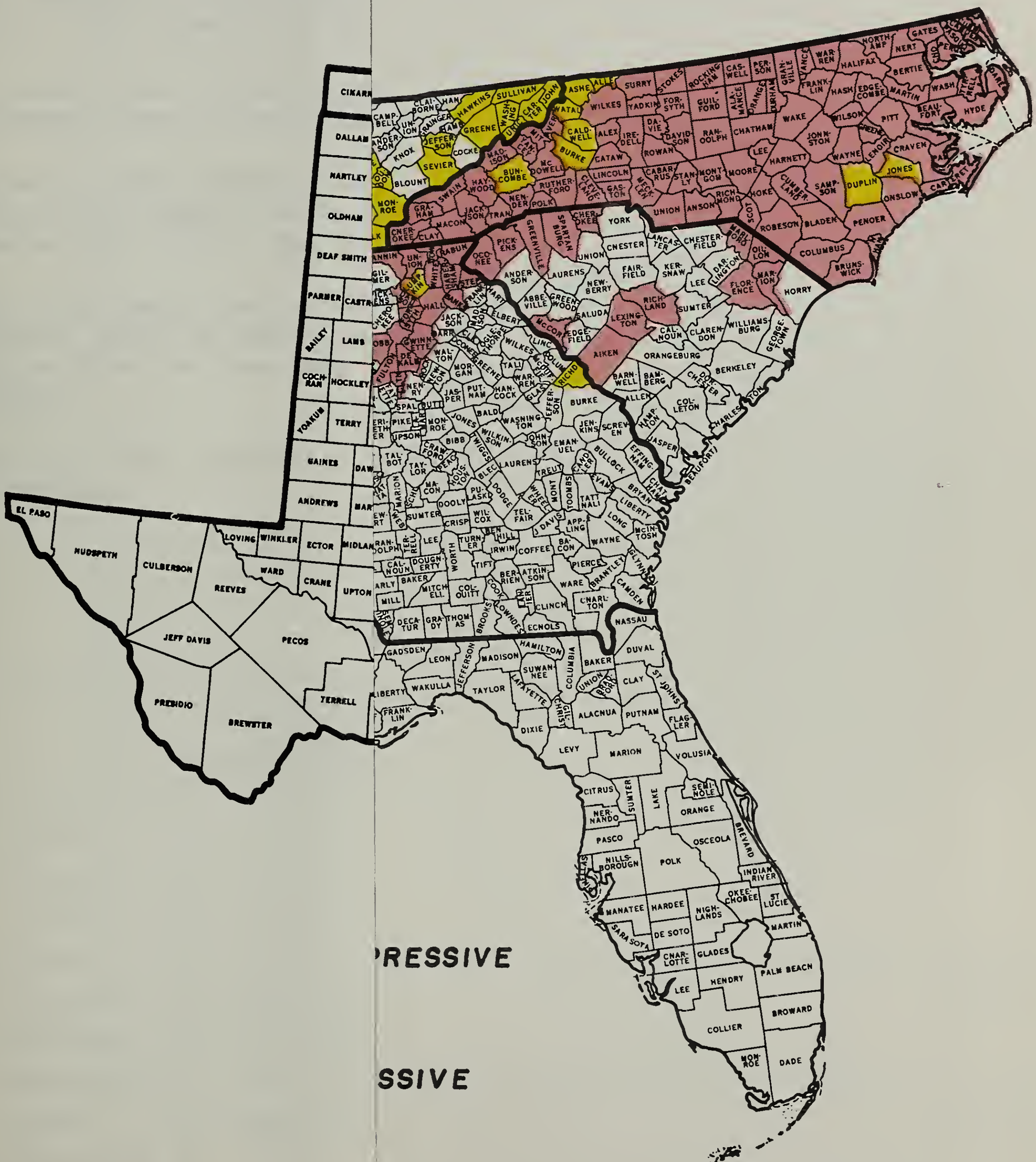
State	Survey and detection			Control	
	Properties surveyed	Traps installed	Acres infested	Acres treated	
				Chemical	Biological
Alabama	97	327	...	...	...
Arkansas	...	211	...	...	...
Florida	...	245	...	...	...
Georgia	134	1,428	89,730	1,904	22
Louisiana	...	43	...	...	...
Mississippi	...	256	...	...	...
North Carolina	1,642	1	3,877	141	1,564
Oklahoma	...	92	...	...	...
South Carolina	106	801	640	...	...
Tennessee	3,908	2,184	553	4,610	...
Texas	...	130	...	...	...
Total	5,887	5,718	94,800	6,655	1,586

Table 11.--Japanese Beetle

State	Regulatory						
	Commodity treatments (visits)	Properties inspected[1/]			Pesticide treatment		
					Soil		Foliage
		Nursery	Industrial	Other	Acres	Cu. ft.	Acres
Georgia	41	64	25	2	345	1,755	...
North Carolina	525	606	530	619	307	209,782	...
South Carolina	1	1	1	...	...	3	...
Tennessee	15	3	1	3	18	...	4
Total	582	674	557	624	670	211,540	4

1/ These figures represent "visits."

L DIVISION



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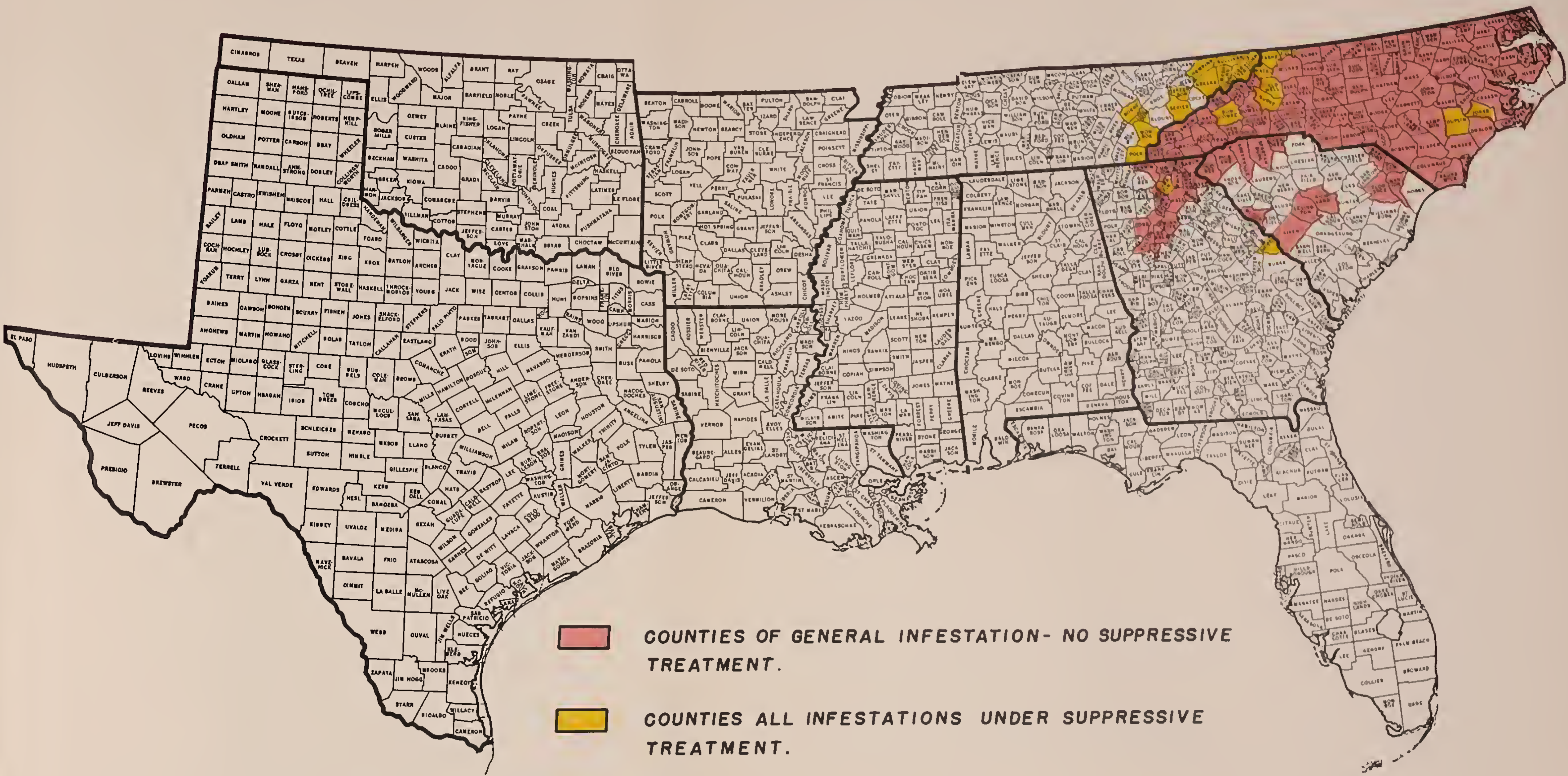
UNITED STATES DEPARTMENT OF AGRICULTURE

AGRICULTURAL RESEARCH SERVICE — PLANT PEST CONTROL DIVISION

SOUTHERN REGION

JAPANESE BEETLE



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KHAPRA BEETLE

Detection surveys for the khapra beetle were conducted at port facilities, grain elevators, seed and feed stores, warehouses, feed lots, and other susceptible points in all States of the Region during fiscal year 1966. Although numerous specimens were collected, no khapra beetles were found.

One railroad car carrying contraband material was fumigated at Birmingham, Alabama. In North Carolina, several railroad cars and motorvans involved in the movement of material that had been exposed to the khapra beetle were treated with insecticide or fumigated as a precautionary measure.

In Florida, the third negative followup inspection was made on several establishments that had received material from an infested ship last year.

Quarantine restrictions in effect at Manchester No. 2 warehouse in Houston, Texas, were removed following three negative inspections. This property was treated last year by the Plant Quarantine Division.

After the khapra beetle infestation was found at Brawley, California, all concerns known to have shipped material to this location were inspected. Many of them now have been inspected the second time, all with negative results.

State and Plant Quarantine inspectors have assisted in the survey in most of the States.

Table 12.--Khapra Beetle

State	Survey and detection		Control	Regulatory		
	Properties		Fumigated (cubic feet)	Properties inspected	Commodity treatments (visits)	Transports treated
	Surveyed	Positive				
Alabama	157			...	...	
Arkansas	275			...	...	
Florida	48			9	...	
Georgia	27			2	3	
Louisiana	907			...	1	
Mississippi	83			1	1	
North Carolina	125			1	1	
Oklahoma	402			9	4	
South Carolina	59			1	1	
Tennessee	224			...	14	
Texas	2,978			5	...	
Total	5,285			28	25	

BURROWING NEMATODE

The burrowing nematode attacks the roots of citrus trees, causing a condition known as spreading decline. As the population and tree damage increase, fruit production decreases. Since Florida produces approximately 73 percent of the citrus in the United States, a serious threat to the citrus production exists. In Florida this is a $2 billion industry.

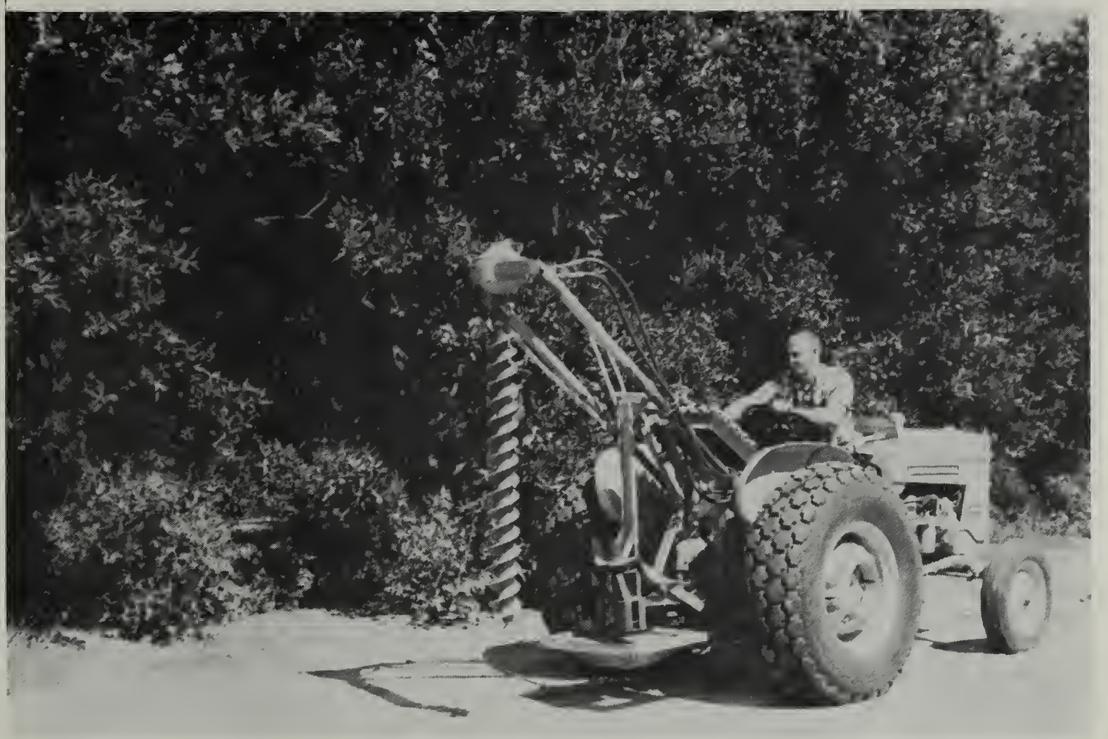
The objective of the program is to confine the present infestation of this pest within the area where it occurs. The ultimate goal is eradication.

Since the beginning of the program, eradication treatments have been applied to 7,893 acres in 1,092 separate citrus groves, and chemical barriers totaling 221 miles have been established to enclose approximately 8,029 acres of infested citrus. At the close of fiscal year 1966, known infestations with no control remain in 247 commercial groves, involving approximately 1,375 acres. These figures represent an overall gain in control efforts of 32 properties involving approximately 250 acres during fiscal year 1966.

Control of spreading decline began in the midfifties with inauguration of the push-and-treat eradication program. This is still the only means of eliminating the burrowing nematode. In 1961, the work was augmented by the barrier program, which retards further spread until eradication treatments can be applied. Work was further enhanced in 1964 with the release of three tolerant or resistant root stocks by Research. These root stocks are being propagated by nurserymen as rapidly as possible and will be available in the near future for replanting pushed-and-treated properties, as well as other areas where the burrowing nematode may be a hazard. Research is being conducted to determine whether these root stocks can be used as barriers between healthy groves and burrowing nematode infestations.

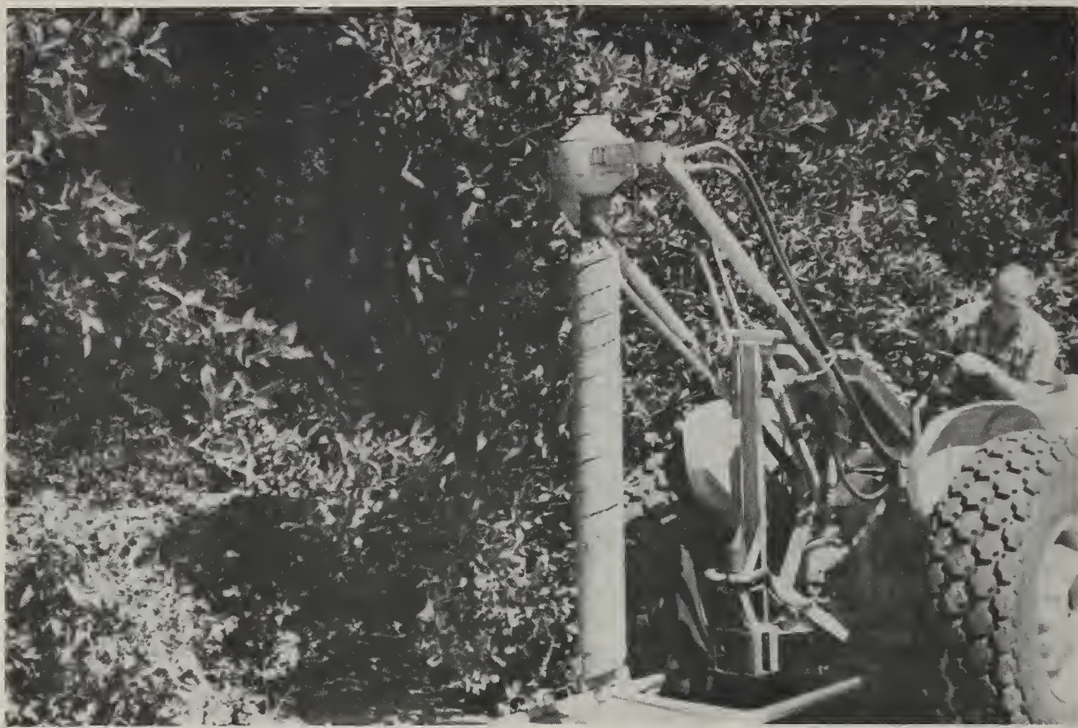
The finding of an infestation in a large citrus nursery in June of 1965 caused some regression of the burrowing nematode work. A considerable amount of effort was required to trace each shipment of plants produced in the infested areas. These were inspected as located; and when infestations were found, delimiting inspections were conducted. Nematodes were found in the environs of 23 nurseries and in the nursery stock of only 9 nurseries. Most of these were small and only a few trees had been moved from the nurseries. In addition, 89 ornamental nurseries were sampled, 5 of which were positive for burrowing nematode. Miscellaneous inspections (soil pits, nursery sites, dooryards, etc.) were conducted on 296 properties, 25 of which were positive.

During the fiscal year, 249,856 root samples were processed in the burrowing nematode laboratories. Burrowing nematodes were found in 6,127, or 2.5 percent, of these samples. This is the largest number of samples processed in any one year since the beginning of the program, and the lower percentage of positive samples than in previous years is thought to be due to the large number of samples collected from nurseries.

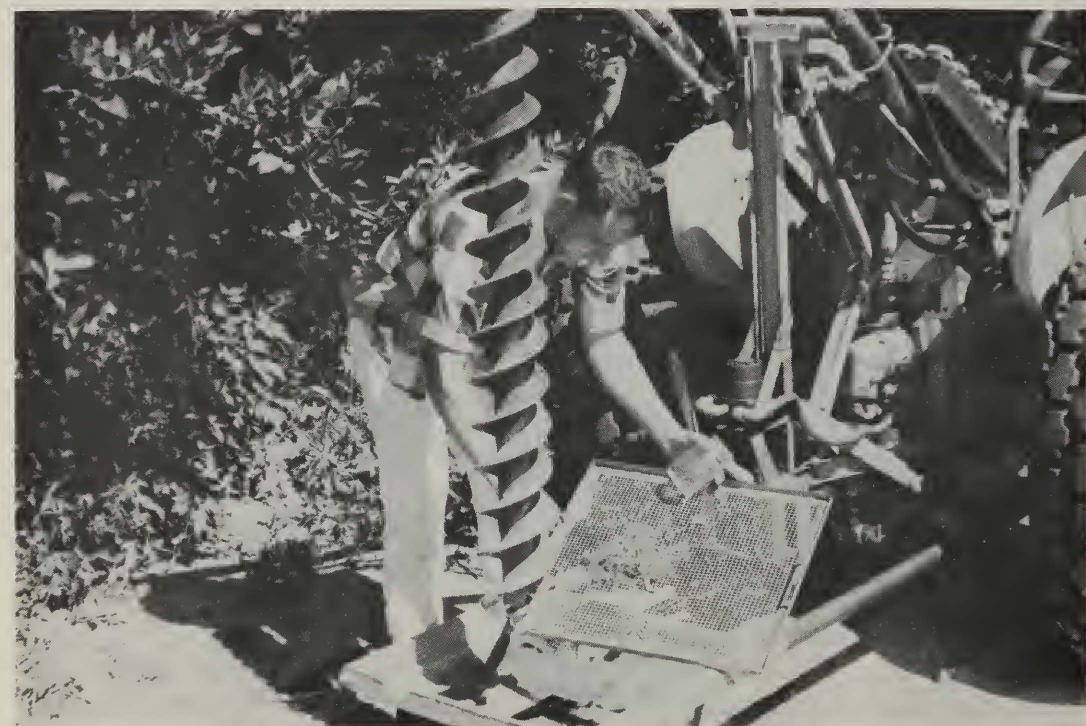


The new tractor-mounted auger used in burrowing nematode survey. This auger takes a sample to 5 feet in depth and 8 inches in diameter.

The auger fully extended into the soil.



The auger withdrawn, showing soil accumulation in auger grooves.



The machine, through a process of vibration, separates the soil from the root particles, which are collected on the screen below.

The machine is transported on a specially built tilt-type trailer.

It is estimated that this machine, with two men, will do the work of three crews, using the conventional method of sample collection.

Table 13.--Burrowing Nematode

State	Survey and detection				Control		Regulatory		
	Surveyed		Infested		Fumigated		Nurseries inspected		Citrus trees heat treated
	Properties	Acres	Properties	Acres	P & T (acres)	Barrier (feet)	No.	Acres	
Florida	3,263	61,997	163	1,141	782	141,797	660	2,937	8,423
Total	3,263	61,997	163	1,141	782	141,797	660	2,937	8,423

SOYBEAN CYST NEMATODE

In the principal soybean-growing areas of the South, from North Carolina to Texas, inspectors have looked for new infestations of the soybean cyst nematode. Inspections are made by collecting and examining soil samples, by plant root pulling and examination, and/or by symptom surveys.

Infestations have been found in only four States in the Southern Region: Arkansas, Mississippi, North Carolina, and Tennessee. No new States have been found infested since 1957; but new counties and extensions in those previously known to be infested are found each year. During fiscal year 1966, fourteen new counties were found in Arkansas, bringing the total in that State to 21; two in Mississippi, making a total of 5; one in North Carolina, for a total of 13; and three in Tennessee, increasing the number in that State to 16.

In the infested areas, the pest is inflicting moderate to heavy losses to the soybean crop. In North Carolina, it is estimated that an overall 30-percent loss occurred on infested properties; many fields suffered as much as an 80-percent loss, with some suffering a total loss.

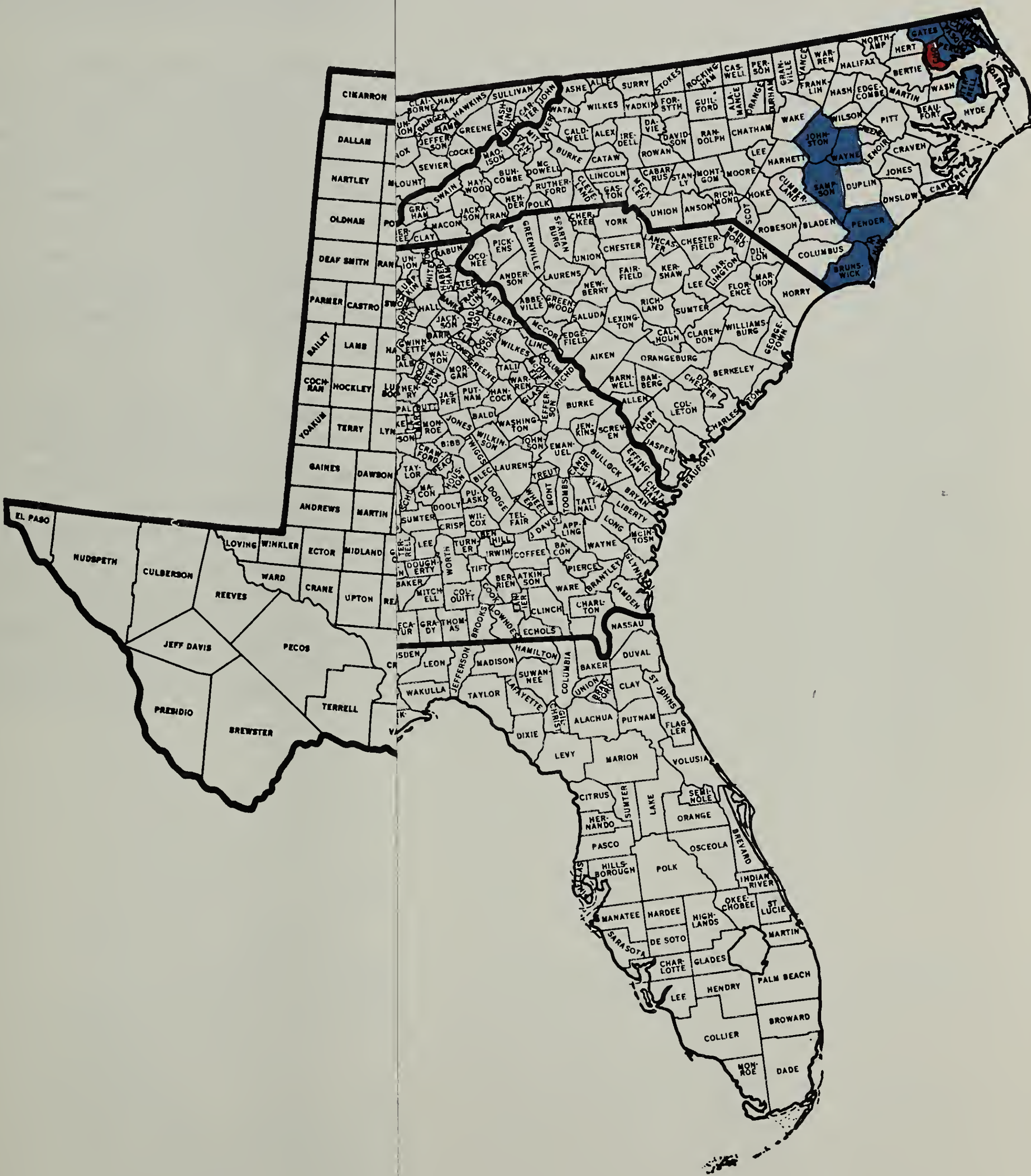
Year-round quarantine enforcement continues in an effort to retard long-distance spread. Disinfesting farm machinery and dirt-moving equipment, certifying regulated farm crops, and inspecting seed beans for peds were the primary quarantine activities.

The farmers are placing much hope for relief from damage in the resistant varieties of soybeans. The "Pickett" soybean is being field-tested in Arkansas, Tennessee, and North Carolina.

Table 14.--Soybean Cyst Nematode

State	Survey and detection				Regulatory			
	Surveyed		Infested		Commodity treatments (visits)	Properties inspected		
	Properties	Acres	Properties	Acres		Nursery	Industrial	Other
Alabama	482	18,166	...	...	...	...	...	...
Arkansas	5,768	264,595	143	15,046	137	24	1,604	757
Florida	68	1,905	...	...	...	...	...	...
Louisiana	476	29,436	...	...	...	...	...	...
Mississippi	694	62,794	3	370	4	...	...	1
North Carolina	2,578	36,243	131	5,245	148	4	329	959
Oklahoma	413	13,475	...	...	1	...	...	...
South Carolina	278	5,083	...	...	...	...	...	...
Tennessee	1,003	101,749	179	69,899	81	8	409	258
Total	11,760	533,446	456	90,560	371	36	2,342	1,975

DIVISION



USDA - ARS - PPC

SOYBEAN CYST NEMATODE

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Louisiana	476	29,436	...	...	...	...	...	...
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Oklahoma	413	13,475	...	...	1	...	...	...
South Carolina	278	5,083	...	...	...	...	...	...
Tennessee	1,003	101,749	179	69,899	81	8	409	258
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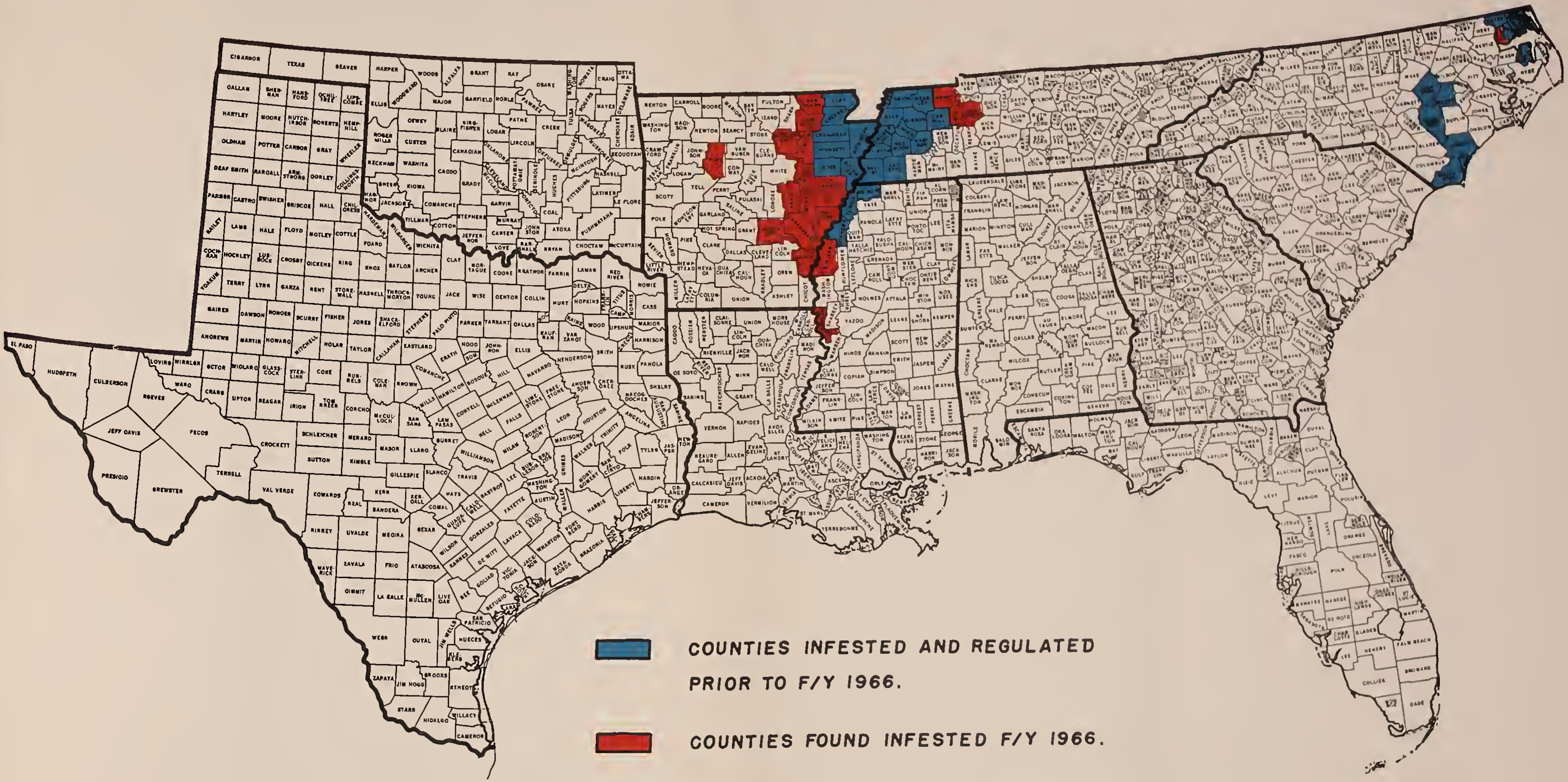
UNITED STATES DEPARTMENT OF AGRICULTURE

AGRICULTURAL RESEARCH SERVICE — PLANT PEST CONTROL DIVISION

SOUTHERN REGION

SOYBEAN CYST NEMATODE



USDA-ARS-PPC

PEACH MOSAIC

Peach mosaic occurs in three States in the Southern Region, Arkansas, Oklahoma, and Texas. The incidence of peach mosaic is low in all of them. It very definitely appears that central Arkansas is near the eastern ecological limits of this disease.

In Arkansas, annual inspections were made of nurseries, budwood sources, and their one-mile environs. In commercial areas, orchards and dooryard plantings were inspected. No peach mosaic was found in the State this year.

In Oklahoma, four counties continue to be carried under State quarantine. Three of these, Alfalfa, Johnston, and Woods, have no nurseries propagating peach trees or budwood at this time and, therefore, these counties are inactive from a regulatory standpoint. In the fourth county, Bryan in southeastern Oklahoma, there are two nurseries propagating peach stock. State and Federal employees inspected these two nurseries, their budwood sources, and their environs. Three infected trees were found. Symptom surveys were made in disease-free counties at nurseries and budwood orchards which grow and propagate peach trees for commercial sale. The results of these inspections were negative.

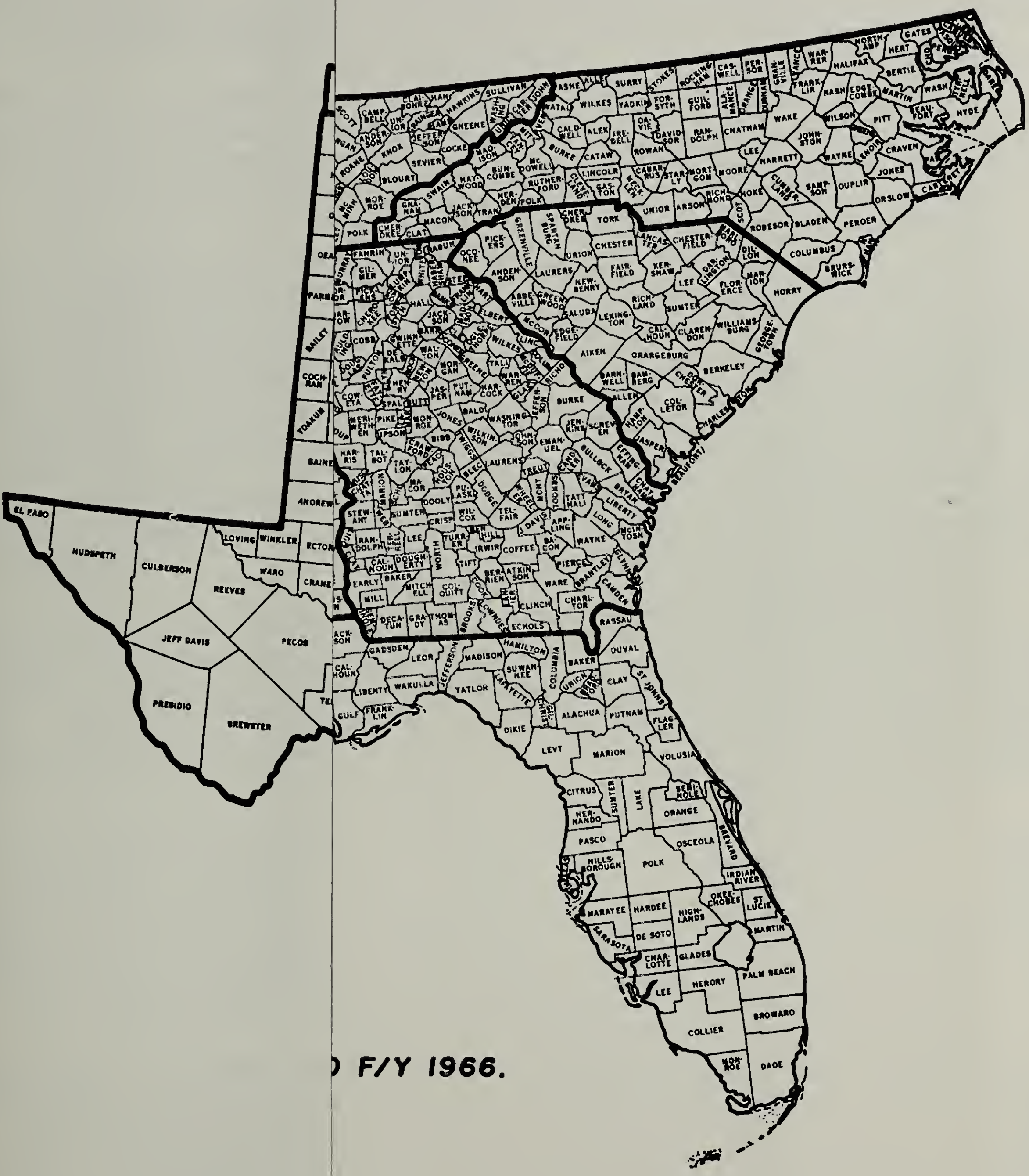
In Texas, there has been a gradual increase in orchards in Blanco and Gillespie Counties in the south-central part of the State during the past few years, and growers have shown considerable interest in the peach mosaic survey. One infected tree, the first found in the 2-county area in 2 years, was removed in Gillespie County. Work in northeast Texas was hampered by rains, and survey was not completed in some peach-growing sections until after harvesting of early varieties had begun. Infections were somewhat higher than in previous years. No work was done in Palo Pinto and Parker Counties, as no infections were found the previous year, and no budwood sources were involved.

Table 15.--Peach Mosaic

State	Survey and detection				Control	Regulatory	
	Properties		Hosts		Trees removed	Properties inspected	
	Surveyed	Infected	Surveyed	Infected		Nursery and environs	Other
Arkansas	178	...	465,542	...	...	...	...
Oklahoma	74	3	1,293,862	3	3	113	...
Texas	161	8	320,616	13	13	93	...
Total	413	11	2,080,020	16	16	206	...

A Peach Mosaic crew at Tyler, Texas, in 1946. How many do you remember?

ᴐL DIVISION



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A Peach Mosaic crew at Tyler, Texas, in 1946. How many do you remember?

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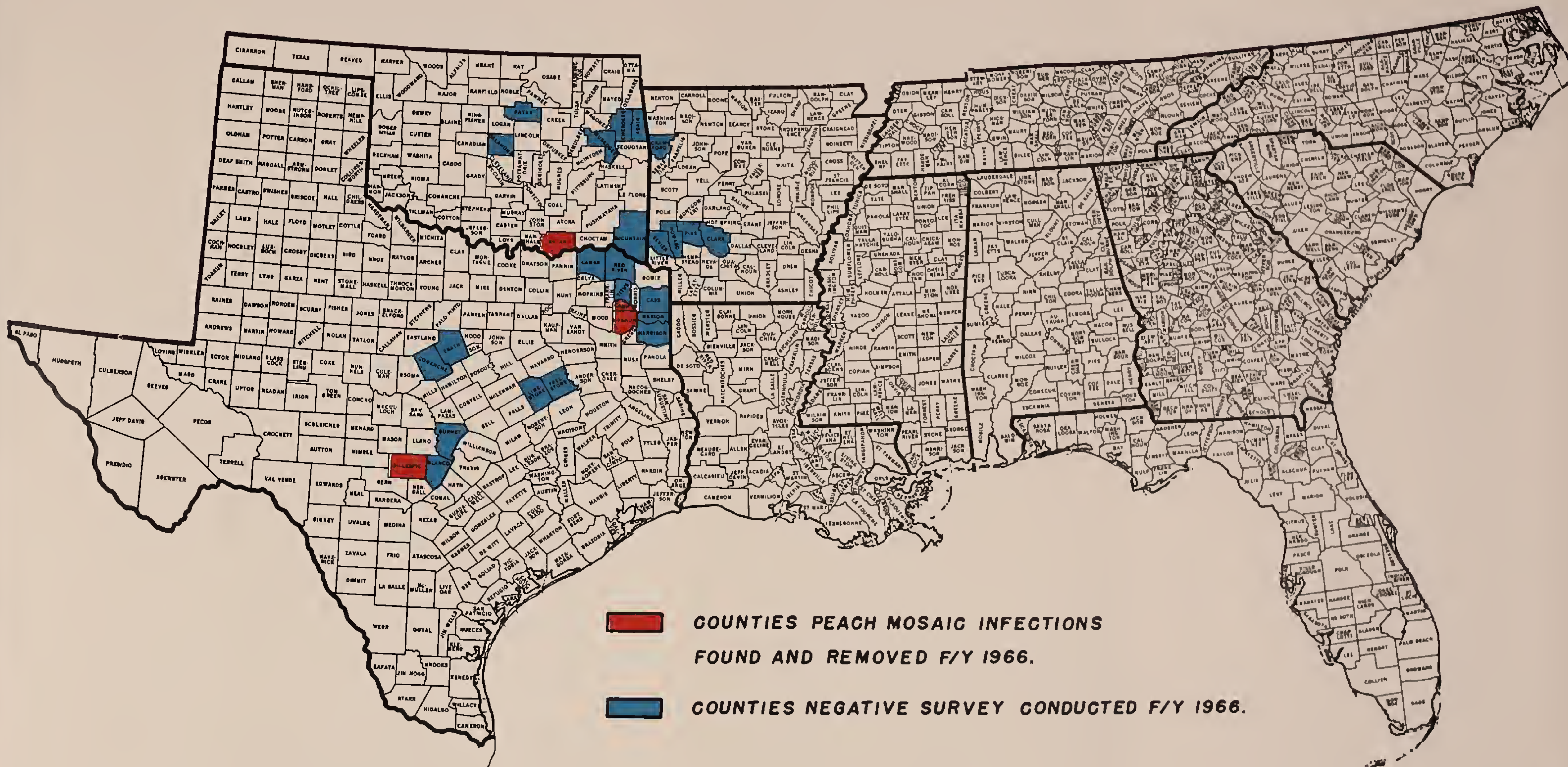
AGRICULTURAL RESEARCH SERVICE — PLANT PEST CONTROL DIVISION

SOUTHERN REGION

PEACH MOSAIC



USDA-ARS-PPO

PHONY PEACH

Cooperative programs for the control of phony peach disease are conducted in the States of Arkansas, Georgia, Louisiana, Mississippi, South Carolina, and Texas. Most of the work is done in Georgia and South Carolina, the two principal peach-producing States in the South. In Arkansas, Louisiana, Mississippi, and Texas the programs are small and designed to assist the growers in protecting a small concentrated industry by assisting in preventing the spread of this disease by locating and removing diseased trees. Declining incidence of infection and good grower support have been experienced in the Southern Region in recent years.

This year, in Arkansas, phony disease was found in peach orchards on 10 properties in 4 counties. Twenty diseased trees were found, all of which were destroyed by the orchard owner under supervision of a PPC or State inspector. No infected trees were found in the nurseries or their environs.

In Georgia, the 1965 orchard survey program was accomplished during a 10-week period, from June 21 to August 27. During the season, 2,775,075 trees in 260 orchards in 28 counties were inspected, and 3,480 phony trees were found. The incidence of infection once again reached an alltime low. This year's figure is 0.13 percent, as compared to 0.17 percent in 1964. This is the eleventh time in the 13-year period since 1952 that there has been a decrease in incidence. Brooks County, in south Georgia, with an incidence of 0.55 percent, continues to have a much higher percentage than average for the State. This county was not included in the program for several years. Control of wild plums, in which the disease is endemic, was continued during this period.

In Louisiana, surveys were made for phony peach disease in commercial orchards in East Feliciana, Lincoln, Morehouse, Ouachita, Rapides, Union, and Webster Parishes. Approximately 4 percent more trees were examined in 1966 than in 1965. Most of this increase was the result of the inspection of approximately 6,000 trees in East Feliciana Parish. The overall incidence of infected trees varied little from recent years.

In Mississippi, the principal peach-growing sections are in Clarke, Hinds, and Lauderdale Counties, where 13,700 trees on 7 properties were inspected and 220 trees were found infected with phony disease. Growers in Clarke and Lauderdale Counties have continued to show interest in the wild plum eradication phase of the program; and during the year, 6 acres of wild plum thickets in these counties were killed with chemical sprays.

Progress on the Phony Peach Program in South Carolina has continued to be outstanding. Two factors have contributed to the results obtained: First, the eradication of wild plums (the alternate host for phony disease) near orchards has received the wholehearted support of the peach growers, with approximately 270 acres of wild plums herbicided this year; and second, qualified inspectors have surveyed the orchards. Growers have requested that trees found even in the early stages of infection be marked for removal rather than waiting until the infected trees are no longer productive. This prevents the vector from feeding on the infected trees and spreading the disease to other trees in the orchard. The reduction in the number of infected trees

found is noteworthy. Of the 1,380,250 trees inspected in South Carolina, only 150 phony trees were found. This is the lowest incidence of the disease in the State since the program was started in 1936. Inspection of selected orchard sites in the Piedmont counties indicates that the disease is no longer a threat to the peach industry in those counties.

In Texas, survey for phony peach was conducted in Blanco and Gillespie Counties in July and August. One infected tree was found and removed, as compared with four trees the previous season. Inspection of one nursery and environs in Bexar County was negative. Survey in 10 counties in the Waco District revealed 39 infected trees in Camp, Freestone, Limestone, and Upshur Counties. All infected trees were immediately removed and destroyed. No infected trees were located in connection with the regulatory inspection of nurseries; however, plum trees were removed from nursery environs in Smith County for certification purposes.

The history of this program and the progress it has made over the years can be seen in a brief review of the phony peach work in Georgia. Primarily, two things have made this progress possible--timely research information and grower support.

Until the vector of phony peach was discovered in 1948, and until the phony virus was found to be endemic in wild plums, it was generally supposed that control was an individual orchard proposition and the surroundings had nothing to do with the incidence of the disease. Such vague ideas of control, influenced in many instances by lack of funds as well as lack of grower support, caused many to question the value of the program. This was particularly true in the Fort Valley, Georgia, area, where approximately 1,600,000 peach trees are grown. By 1947, the situation had become most discouraging, for the incidence of infection continued to hover around the 3.5 percent mark despite yearly inspections and removal of diseased trees. A meeting of peach growers was called, and it was proposed that control efforts in the Fort Valley area be abandoned until such time as additional research offered new approaches to the problem. The assembled growers opposed the plan, and PPC adopted a compromise plan of inspecting orchards only upon written request from the owners. Under the system of inspecting all orchards possible, we had actually averaged working about 85 percent of the trees annually; and infection averaged around 3.5 percent.

Under the new compromise plan, only 53 percent of the trees were inspected in 1947, 42 percent in 1948, 39 percent in 1949, and 37 percent in 1950. Phony infection increased from 3.3 percent in 1947 to 6.25 percent in 1949. In 1950, there was a slight drop to 5.0 percent, but only because so few scattered orchards were inspected. There was, therefore, a very definite upward climb in phony incidence, and losses in individual orchards became disastrous.

In discussion with State and Federal control officials following the 1950 season, it was decided to abandon the request-type program and make an attempt to inspect the orchards on an areawide basis. This plan got under way in 1951. All orchards in the 4-county Fort Valley area were separated into groups of those within a mile of each other. Inspections were made only if all orchard owners within such areas agreed to cooperate. Owners were

required to furnish labor to delimb infected trees and remove the stumps promptly.

The results of the first year under this plan of operation were surprisingly good. In the entire area, which included two orchards in Bibb County and heavily infected Macon County, PPC inspectors and growers together inspected 1,280,375 of the 1,587,815 trees, or about 81 percent of the total; and 101,968, or 7.9 percent, were found infected and were destroyed. In addition, nearly 200,000 trees in solid blocks were removed because of severe phony infection. That first year of an all-out effort met with better success than had been anticipated. All except 12 growers agreed to cooperate, and each of the 12 agreed to remove his heavily infected orchards and to rogue the diseased trees in his other orchards.

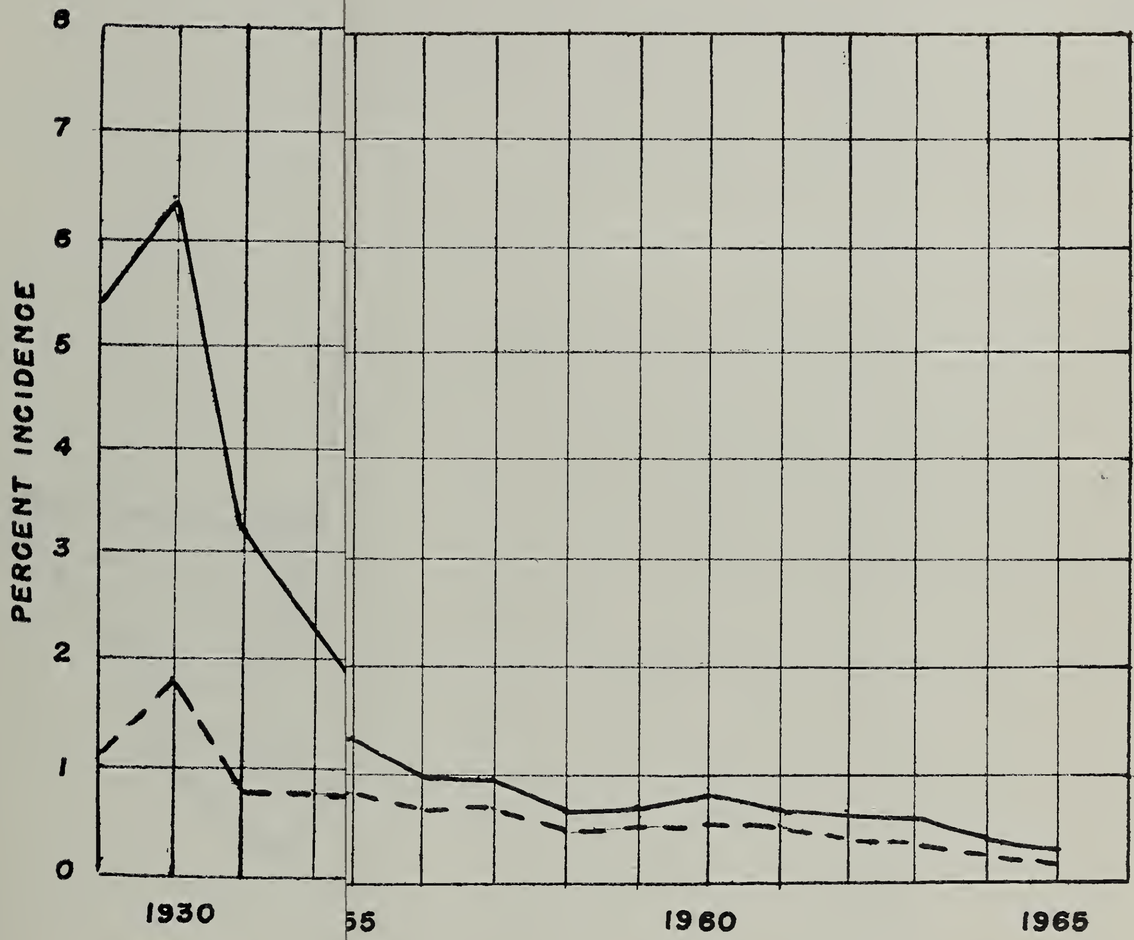
It was at this time, also, that the program of removing wild plum thickets in the vicinity of peach orchards was begun. Destruction of wild plums began rather slowly; but from 1955 to the present time, the growers have waged a persistent war against wild plums. It is believed the destruction of these wild hosts has played a most important part in bringing the incidence of the disease down to the present negligible figure.

Since 1951, the program in that 4-county Fort Valley area has been one of continuing success. In 1952, infection dropped to 6.3 percent; in 1953, to 3.1 percent; in 1954 and 1955, to 1.3 percent; then in 1956, down to 0.95 percent, the first time it had been below 1 percent since the program began in 1929. As the following graph shows, never again has the infection risen above the 1 percent mark. In 1965, it was only 0.18 percent, which means that, from an economic standpoint, phony disease no longer is a serious problem in the Fort Valley area. Past history shows, however, that in the absence of a persistent annual survey and control program, it very easily could again become an economic threat.

Table 16.--Phony Peach

State	Survey and detection				Control		Regulatory	
	Properties		Hosts		Trees removed	Acres herbicided	Nurseries inspected	Other
	Surveyed	Infected	Surveyed	Infected				
Arkansas	125	10	365,675	20	20	...	...	...
Georgia	260	209	2,775,075	3,480	3,480	33	11	...
Louisiana	68	32	143,819	467	467	...	...	...
Mississippi	7	7	13,700	220	117	6	...	...
South Carolina	287	58	1,380,250	150	150	275	...	...
Texas	137	8	266,091	40	40	...	33	...
Total	884	324	4,944,610	4,377	4,274	314	44	...

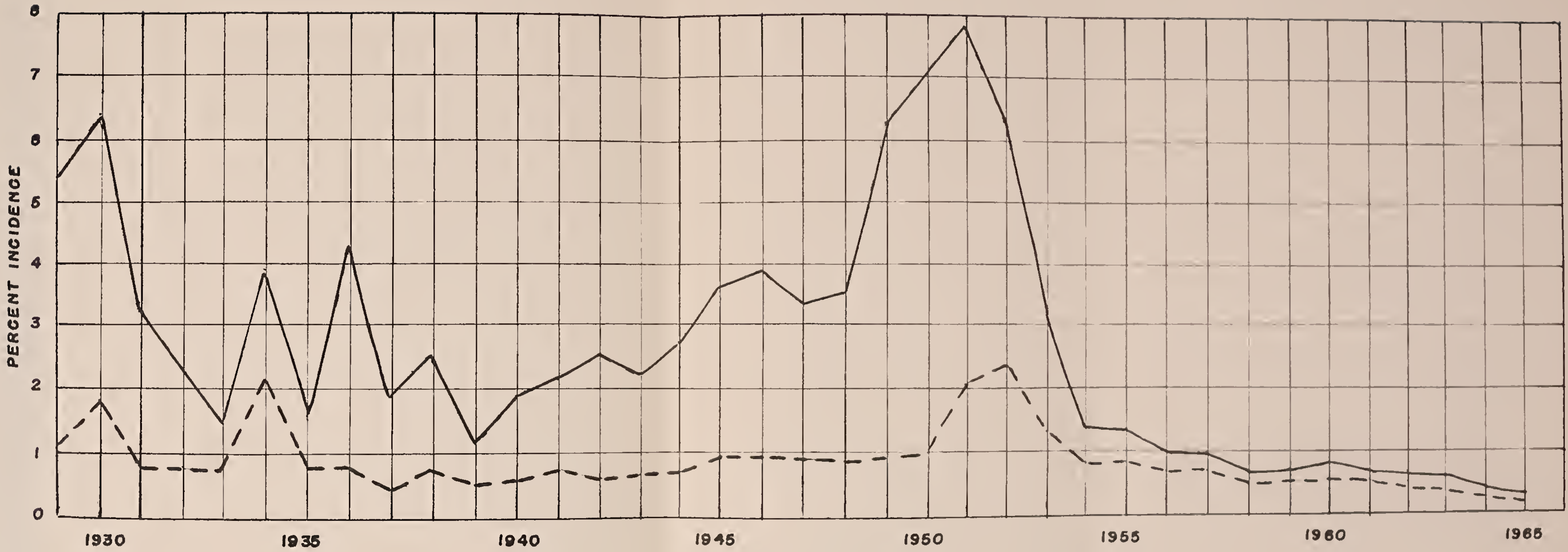
A normal peach tree on the right; a phony tree on the left. Note dwarfing. This tree is past the stage when it will produce normal peaches.



1, MACON AND PEACH COUNTIES, GEORGIA.)

A normal peach tree on the right; a phony tree on the left. Note dwarfing. This tree is past the stage when it will produce normal peaches.

INCIDENCE OF PHONY PEACH DISEASE 1929 - 1965.



——— PHONY PEACH DISEASE INCIDENCE IN THE FORT VALLEY AREA. (CRAWFORD, HOUSTON, MACON AND PEACH COUNTIES, GEORGIA.)

– – – PHONY PEACH DISEASE INCIDENCE IN THE SOUTHERN REGION.

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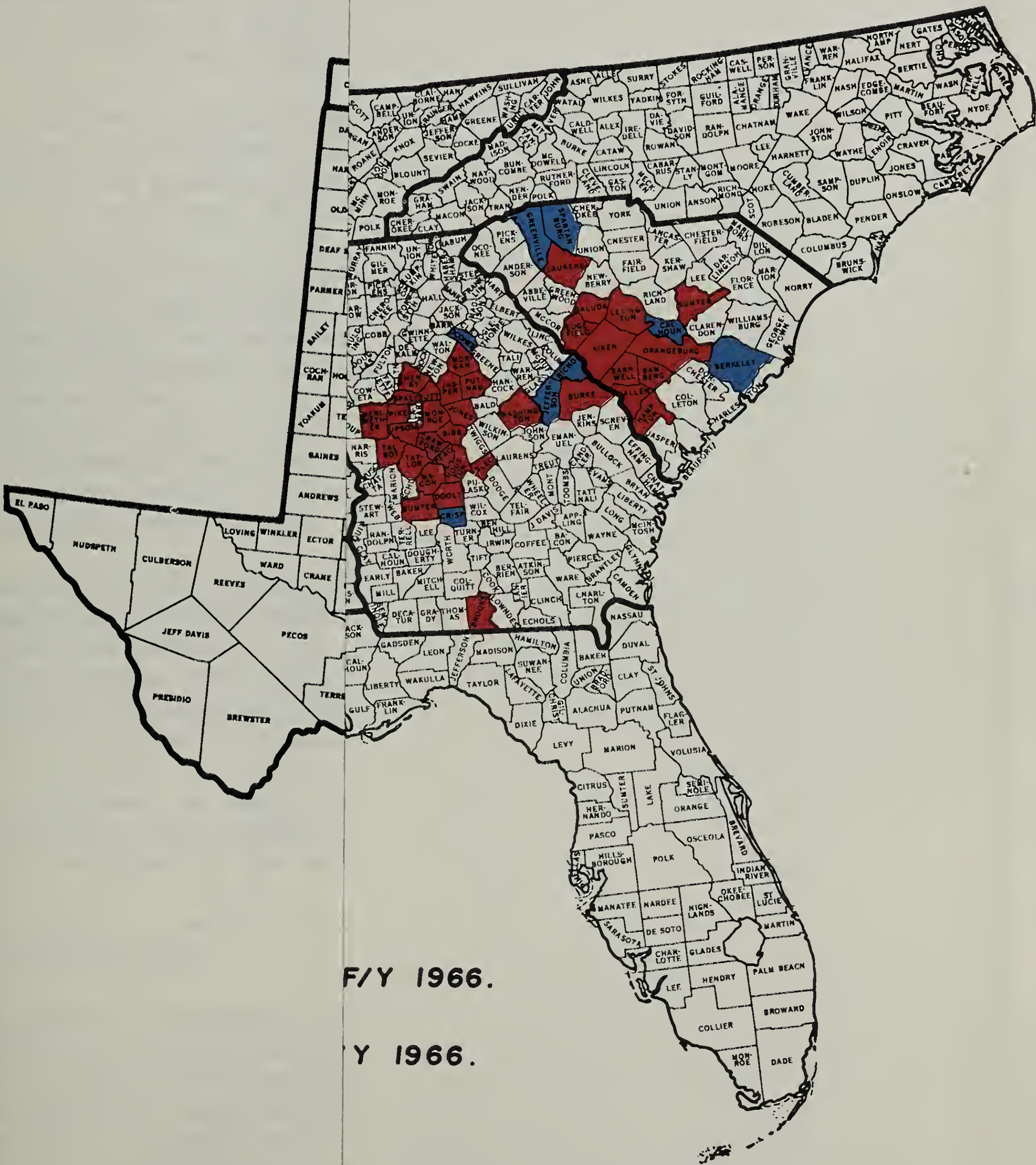

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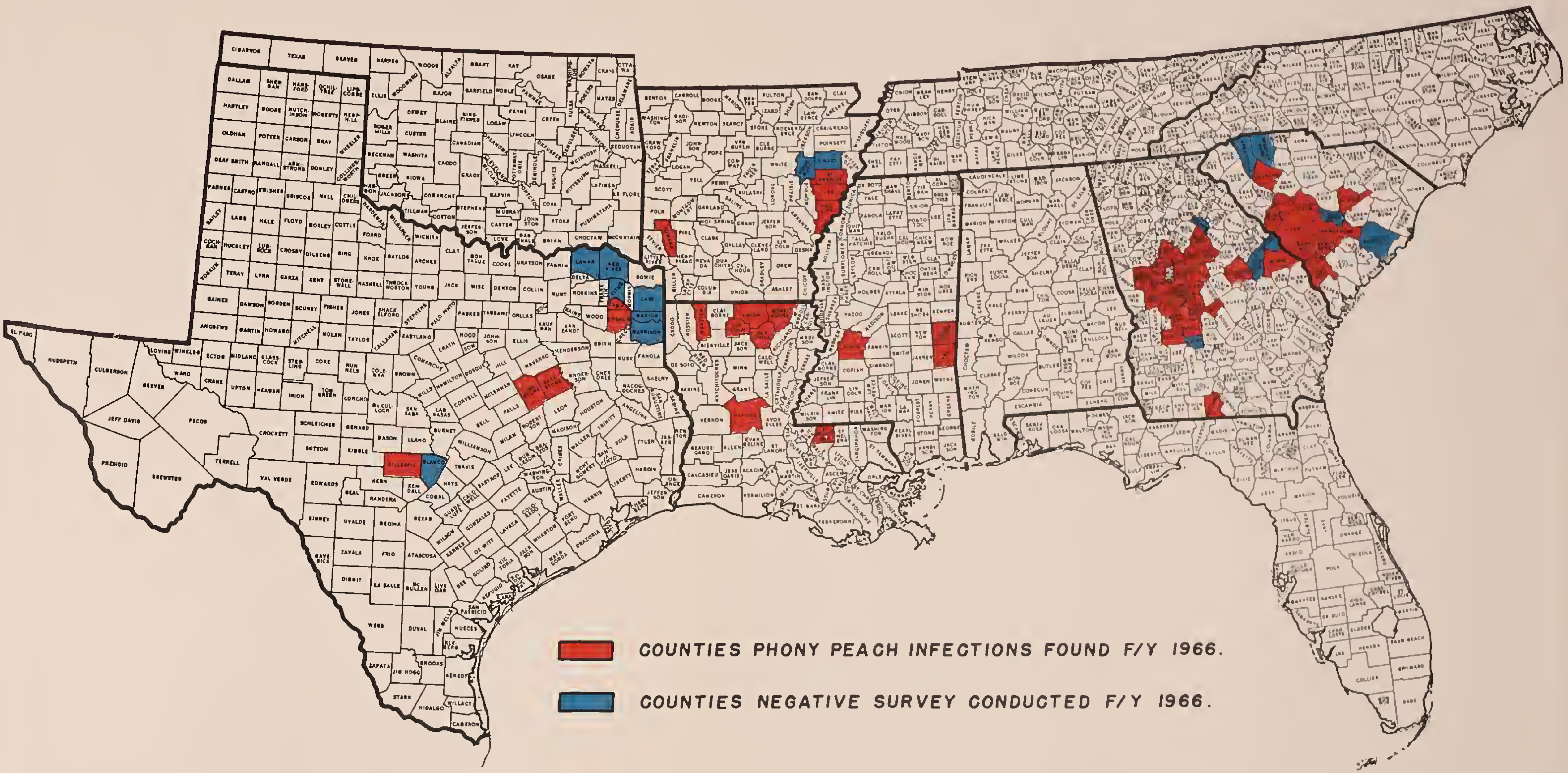
AGRICULTURAL RESEARCH SERVICE — PLANT PEST CONTROL DIVISION

SOUTHERN REGION

PHONY PEACH



COUNTIES PHONY PEACH INFECTIONS FOUND F/Y 1966.

COUNTIES NEGATIVE SURVEY CONDUCTED F/Y 1966.

USDA-ARS-PPC

PINK BOLLWORM AND WILD COTTON

Pink Bollworm

There was a slight increase in pink bollworm populations in the central counties of Oklahoma, and in the Blackland and Trans-Pecos areas and Hudspeth and El Paso Counties in Texas. There are no mandatory cultural control practices in Oklahoma; and in Texas, the lack of compliance with planting and stalk destruction requirements (caused in large part by inclement weather) probably contributed to the increase in populations. The mandatory stalk destruction program was continued in the western counties of Texas in an effort to reduce populations.

Pink bollworm infestations were found in 12 counties in Arkansas and 17 parishes in Louisiana, as compared to 2 counties and 3 parishes, respectively, the previous year. One parish, Avoyelles, in Louisiana was outside the regulated area. The infestation in these two States is very light.

Though all methods of survey are used to a limited extent, the principal methods are lint cleaner inspection in Texas and lint cleaner and gin trash inspection in Arkansas and Louisiana. Surveys for pink bollworm were conducted in Tennessee, Mississippi, Alabama, Georgia, and North Carolina, with negative results. Gin trash inspection was the principal method of survey in Tennessee. Lint cleaner and gin trash inspections were made in 41 counties in Mississippi and lint cleaner inspections only in an additional 15 counties. In Alabama, all of the principal cotton-growing counties were surveyed, and in Georgia emphasis was given to counties not surveyed the previous year.

Late heavy rains throughout east and south Texas prevented farmers from complying with the stalk destruction deadline. Although a bumper crop of cotton was produced throughout the State, rains were so heavy in some parts of the Brazos River bottoms that farmers lost their crops. State and PPC personnel formulated plans to continue and improve the voluntary cultural control program in eastern and south-central Oklahoma.

In Louisiana, an early harvest enabled many growers to complete stalk destruction well ahead of schedule. Approximately 95 percent of the stalks were destroyed by the deadline date.

In Arkansas, compliance with mandatory stalk destruction requirements was considered good.

Regulatory activities in Texas, Oklahoma, Arkansas, and Louisiana were heavy. Changes in the regulation exempting linters from certification when produced in an authorized plant and stored and handled to prevent contamination increased the supervision required for oil mills. Other phases of the regulatory program were normal for the year. Movement of green, edible okra from the quarantined area of Texas was about the same as last year. A record number of mechanical harvesters moved into and out of the generally infested area. Because of other program quarantines, much of this equipment had to be cleaned and fumigated before being certified for movement into the area regulated for pink bollworm.

Road stations again were operated at the Oklahoma-Arkansas, Texas-Arkansas, Texas-Louisiana, and Arkansas-Mississippi State lines.

Wild Cotton

The Wild Cotton Program continued to be successful in holding the pink bollworm in south Florida and preventing spread to the commercial cotton-producing areas of the southeastern States. Hurricanes pushed salt water over some of the land supporting wild cotton, retarding growth of the cotton and development of fruit.

All of the known cotton locations were cleaned one time, and many of those supporting the greatest amount of cotton were cleaned twice. Special emphasis was placed on survey for ornamental cotton plants in Dade, Hillsborough, Pinellas, Manatee, Sarasota, and Lee Counties.

A land survey crew reported a cotton location on Marco Island, which was approximately 50 feet wide by 175 feet long and completely surrounded by low marshland. As a result, a helicopter was used for survey on Marco Island in Collier County and Sanibel and Captiva Islands in Lee County. Three new cotton locations were found on Marco Island and one on Sanibel Island. These locations were accurately located on maps and later visited by ground crews, who destroyed the cotton plants.

Infestations of pink bollworm were found in Lee and Monroe Counties by inspection of green cotton bolls. Inspection of okra and single red hibiscus was negative for pink bollworm.

Housetrailers used for living quarters for personnel at Cape Sable were upgraded by the acquisition of eleven better trailers from military surplus. A new food freezer was bought, which permits the purchase and storage of larger quantities of meat for personnel at Cape Sable.

Tests with the herbicides Tordon, Simazine, Gransil X, and Atrazine are being conducted on wild cotton in cooperation with the Methods Improvement staff. Also, two plots were fumigated with methyl bromide. Some means of preventing germination of wild cotton seed would be very beneficial in the eradication program.

Table 17.--Pink Bollworm

State	Survey and detection			Control	Regulatory		
	Properties surveyed	Bu. of gin trash examined	Properties infested	Acres treated (mechanical)	Commodity treatments (visits)	Properties inspected 1/	
						Industrial	Other
Alabama	132	...	...	...	...	...	...
Arkansas	12,480	42,079	12 2/	1,178,294	100	2,756	73
Georgia	259	1,078	...	...	1	3	...
Louisiana	2,167	8,607	73	131,997	36	1,473	143
Mississippi	5,108	11,902	...	...	7	53	2
North Carolina	9	...	...	...	...	...	...
Oklahoma	470	2,091	132	50,840	28	1,420	...
Tennessee	719	6,061	...	...	33	124	3
Texas	6,086	887	850	1,872,639	966	20,183	152
Total	27,430	72,705	1,067	3,233,770	1,171	26,012	373

1/ These figures represent "visits."
2/ Number of counties in Arkansas from which positive specimens were recovered.

Table 18.--Wild Cotton

State	Survey and detection				Control	
	Locations inspected	Acres inspected	Hosts examined	Hosts infested	Mechanical	
					Plants	Acres
Florida	92,845	127,213	72,183	60	16,120	995
Total	92,845	127,213	72,183	60	16,120	995

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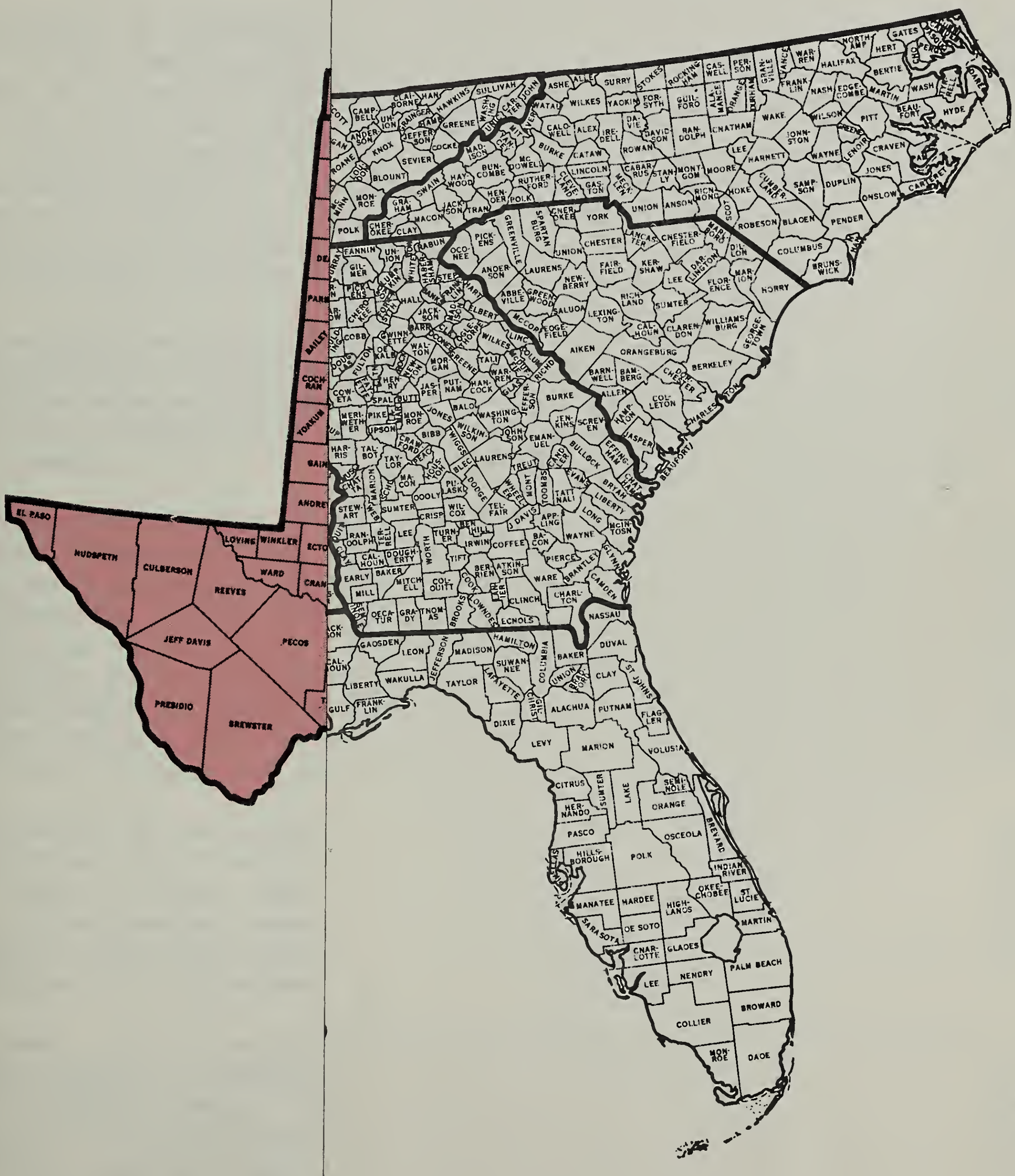

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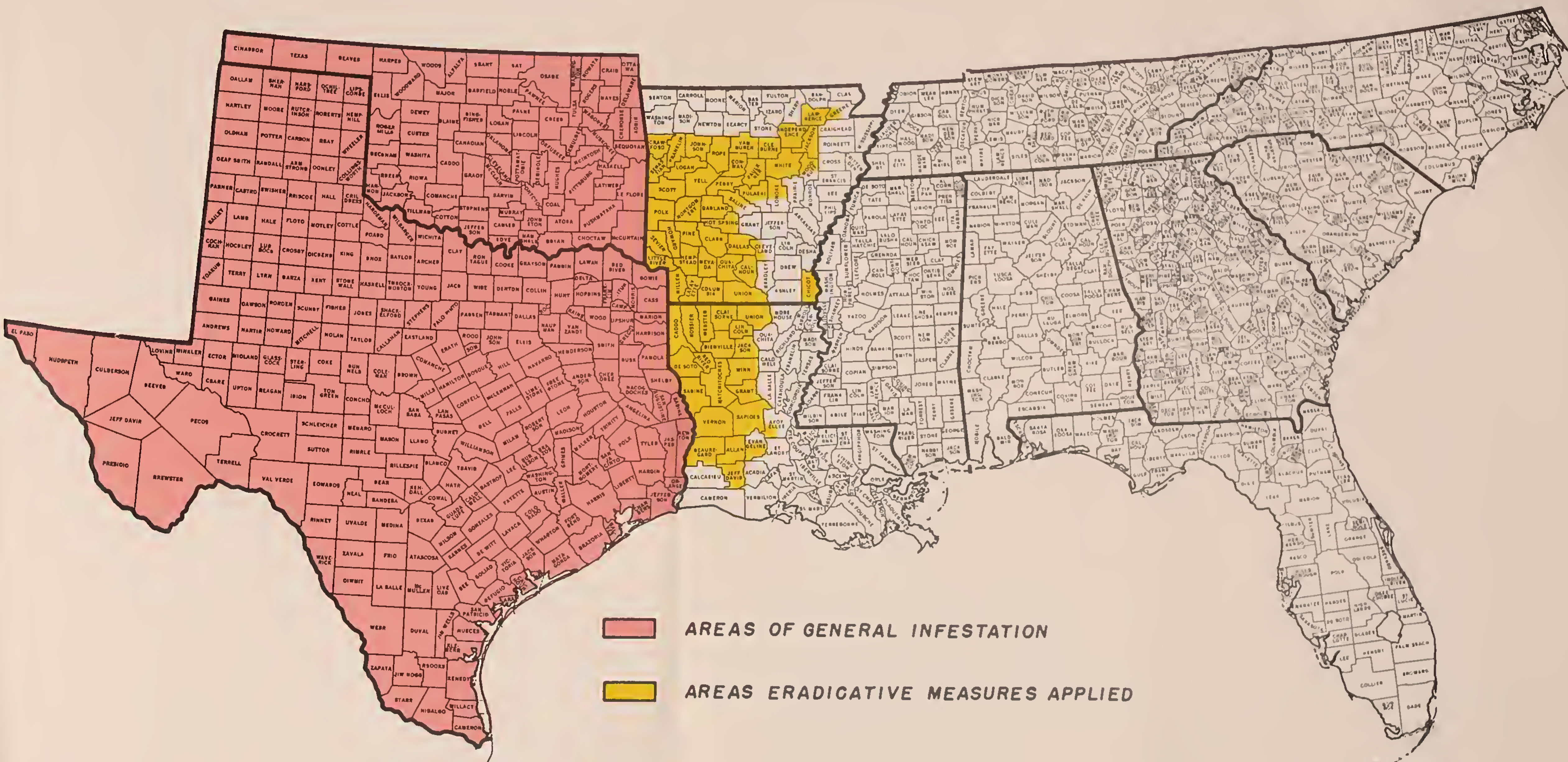
UNITED STATES DEPARTMENT OF AGRICULTURE

AGRICULTURAL RESEARCH SERVICE — PLANT PEST CONTROL DIVISION

SOUTHERN REGION

PINK BOLLWORM



USDA-ARS-PPC

SWEETPOTATO WEEVIL

Sweetpotato weevil infestations remained under control in commercial areas during fiscal year 1966, but new infestations in home plantings were found in most States.

No new infestations were found in Alabama this season, but the infested area in the southern part of the State remained about the same as the past several years due to carryover of weevils in wild host plants.

In Georgia, an increase in the number of infested properties in home plantings in Ware and Appling Counties was caused by the distribution of infested plants by a certified grower. The State has declared nonplanting zones in the city limits and environs of Waycross, Albany, Moultrie, and Valdosta. All growers in Appling County are signing agreements to follow the prescribed insecticidal program. The situation in other infested counties remains unchanged from last year. A shipment of plants from Tennessee was intercepted at Moultrie in Colquitt County and destroyed as required by State regulations. Tennessee does not have a certification program for sweetpotato plants.

In Louisiana, surveys outside the control zone resulted in the finding of infestations in Bienville and Bossier Parishes for the first time. Control practices were put into effect immediately on the new infested properties. There was no appreciable damage reported in any part of the commercial area this season.

In Mississippi, a few infested properties were found in Adams and Jones Counties this year. One infestation in Hinds County, caused by infested potatoes from Copiah County, was cleaned and treated. No weevils were found on properties listed as infested in Amite, Lincoln, and Simpson Counties. Growers in Greene County have lost interest in the eradication program, and the county will be placed in the control area. The infested status in Copiah County has improved in that several growers controlling infested properties have gone out of the potato-growing business, and these properties now can be cleaned and treated.

Eradication is the object of the program in South Carolina. New infested properties, all of which were small home plantings, were found in Charleston and Jasper Counties, and all received immediate treatment. Inspections were made in nonplanting zones, and all volunteer plants found were destroyed. An active herbicide program on wild host plants in the coastal areas was conducted, as in previous years.

In Texas, the fall survey of stored potatoes resulted in the discovery of 59 new infested properties and the finding of infestations for the first time in Smith County. The treatment of warehouse facilities was omitted because of constant recontamination caused by the exchange of crates between dealers. Regulatory and field treatments were applied in Anderson, Cherokee, Leon, Panola, Rusk, and Shelby Counties to create a buffer zone. The Texas Department of Agriculture made the necessary contacts with growers prior to treatment. Insecticide and vehicles were furnished by Plant Pest Control.

Table 19.--Sweetpotato Weevil

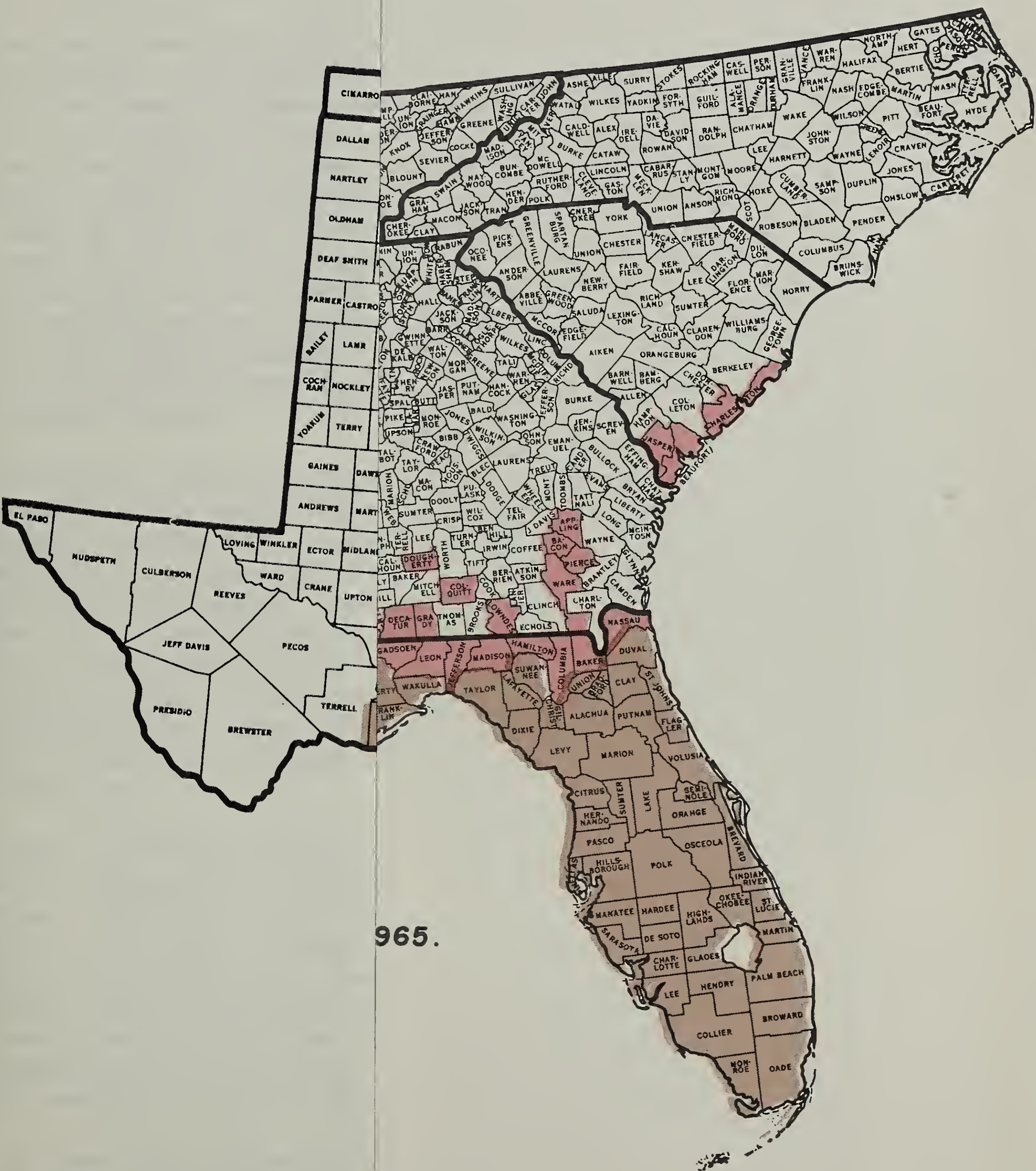
State	Survey and detection			Control		
	Properties			Acres treated		Bu. treated
	Surveyed	Active	Released	Chemical	Mechanical	
Ala.	4,018	160	14	761	...	4,750
Fla.	...	735	...	...	...	...
Ga.	2,285	42	16	8	7	...
La.	19,546	724	268	826	20,905	2,232,224
Miss.	6,460	298	84	...	...	...
N. C.	14	...	...	...	...	...
S. C.	3,974	38	...	634	...	...
Texas	1,727	178	14 1/	586	...	...
Total	38,024	2,175	396	2,815	20,912	2,236,974

1/ In Texas, farms are inspected, in the fall, in the counties in which sweetpotato weevil work is being conducted. Figures for number of infested properties are established each year, following the fall survey. This figure represents the difference in number of infestations in counties with fewer finds in 1966 than 1965.

Table 20.--Sweetpotato Weevil

State	Regulatory					
	Commodity treatments (visits)	Properties inspected			Pesticide treatments	
		Seed beds	Industrial	Other	Surface (acres)	Storage area (Cu. ft.)
Ala.	...	...	229	928	...	...
Ga.	...	...	12	114	...	...
La.	3,508	445	1,918	25,885	457	3,877,929
Miss.	45	...	...	447	4	278,611
Texas	...	...	...	...	2	...
Total	3,553	445	2,159	27,374	463	4,156,540

DIVISION



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USDA - ARS - PPC

Table 19.--Sweetpotato Weevil

State	Survey and detection			Control		
	Properties			Acres treated		Bu. treated
	Surveyed	Active	Released	Chemical	Mechanical	
Ala.	4,018	160	14	761	...	4,750
Fla.	...	735	...	...	...	...
Ga.	2,285	42	16	8	7	...
La.	19,546	724	268	826	20,905	2,232,224
Miss.	6,460	298	84	...	...	...
N. C.	14	...	...	...	...	...
S. C.	3,974	38	...	634	...	...
Texas	1,727	178	14[1/]	586	...	...
Total	38,024	2,175	396	2,815	20,912	2,236,974

1/ In Texas, farms are inspected, in the fall, in the counties in which sweetpotato weevil work is being conducted. Figures for number of infested properties are established each year, following the fall survey. This figure represents the difference in number of infestations in counties with fewer finds in 1966 than 1965.

Table 20.--Sweetpotato Weevil

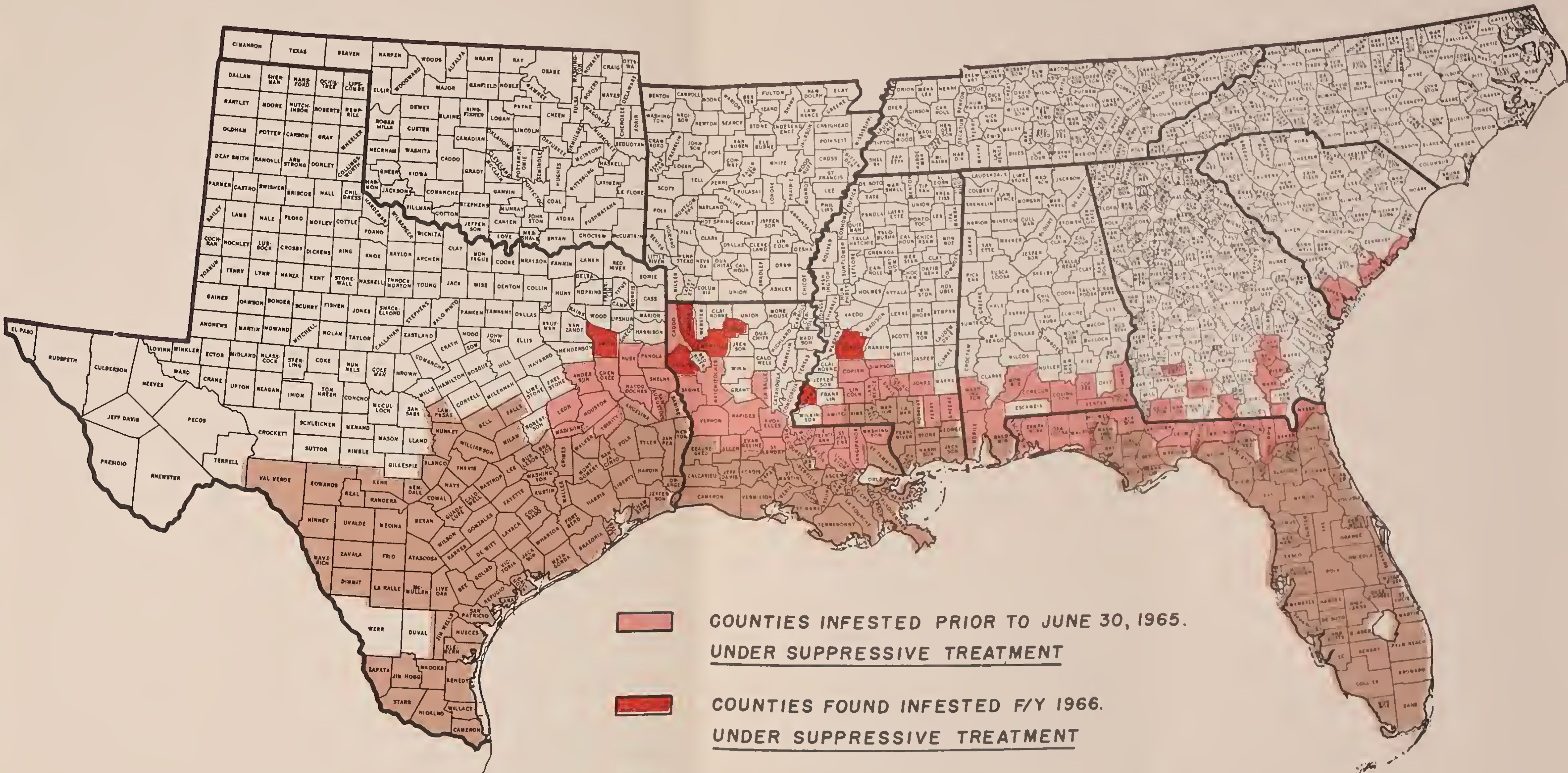
State	Regulatory					
	Commodity treatments (visits)	Properties inspected			Pesticide treatments	
		Seed beds	Industrial	Other	Surface (acres)	Storage area (Cu. ft.)
Ala.	...	...	229	928	...	...
Ga.	...	...	12	114	...	...
La.	3,508	445	1,918	25,885	457	3,877,929
Miss.	45	...	...	447	4	278,611
Texas	...	...	...	...	2	...
Total	3,553	445	2,159	27,374	463	4,156,540

UNITED STATES DEPARTMENT OF AGRICULTURE

AGRICULTURAL RESEARCH SERVICE — PLANT PEST CONTROL DIVISION

SOUTHERN REGION

SWEETPOTATO WEEVIL



COUNTIES INFESTED PRIOR TO JUNE 30, 1965.
UNDER SUPPRESSIVE TREATMENT

COUNTIES FOUND INFESTED F/Y 1966.
UNDER SUPPRESSIVE TREATMENT

AREAS OF GENERAL INFESTATION.
REGULTATORY ACTION ONLY.

USDA - ARS - PPC

WHITE-FRINGED BEETLE

The most significant of the new infestations of white-fringed beetles found in the Southern Region were in Louisiana, in the three northeast parishes of Caldwell, Franklin, and Ouachita. Except for a few acres of infestation in Union Parish, the white-fringed beetle in Louisiana, prior to this season, had been confined to the southern portion of the State, principally in the Florida parishes. Additional infestations were found, also, in the other eight infested States of the Region.

Survey and inspection were aimed primarily at locations which, if they harbored beetles, would be a potential spread. After Graphognathus peregrinus in Mobile County, Alabama, was found to be resistant to dieldrin, nurseries within the regulated areas were thoroughly reinspected. Through the combined cooperative efforts of the nurserymen, the Alabama State Department of Agriculture, and PPC, it appears that eradication of the white-fringed beetle is in sight in the small area where resistance appeared. The area was thoroughly cleaned of brush and overgrown nursery stock, and applications of 25 pounds of actual DDT per acre were incorporated into the soil. In some situations where populations were heavy and the ground was rough, the sites were fumigated with methyl bromide. During the past two adult seasons, using a bush-hog to keep weed growth low, the area has been treated continuously with a DDT emulsion spray.

Still further restrictions imposed this year against the use of chlorinated hydrocarbons are beginning to show their effects in some sections, more especially in the old generally infested farm areas. Populations are progressively increasing and there is a corresponding increase in crop damage. Aside from crop damage, local spread is more rapid and regulation of farm crops, such as small grain, peanuts, and potatoes, is more demanding. Because of population pressures, it has become necessary to place more and more spray units in the field for applying adult treatments to protect nursery and other plant areas, croplands, and industrial sites that have been freed of the white-fringed beetle by prior treatment with approved residual insecticides.

Although the White-fringed Beetle Program has been greatly handicapped because of regulations against the use of residual insecticides, a review of the program shows that the status of the work is far from discouraging. For example, all known infested grounds in Arkansas have been treated except 5 acres; all in South Carolina have been treated except 30 acres; and in North Carolina, only 8 counties have nontreated lands. Further study shows that if it were possible to treat 105,000 acres, all known infested lands in 216 counties would be treated. This would represent more than 60 percent of the total remaining counties having nontreated infested lands.

It is hoped that Research, coupled with the PPC methods improvement program, can develop safe, effective treatments that will permit once again an aggressive program which will reduce the infested area and provide a means of alleviating crop damage. It is frightening to consider a white-fringed beetle population that is resistant to chlorinated hydrocarbons when we have no safe and effective treatment available.

The small area where resistance appeared in Alabama exemplified too well the tremendous potential of this species to develop unbelievable populations and their destructive capabilities, even as adults, to destroy plant life.

The Entomology Research Division's White-Fringed Beetle Research Investigations Laboratory, located at Gulfport, Mississippi, now has a complete staff of personnel for conducting research on control, regulatory, and survey methods. In addition to developing methods for determining pesticide resistance and screening tests for substitute chemicals, they have almost completed installation of equipment for mass-producing a parasitic nematode which has shown itself to be very effective in laboratory tests against white-fringed beetle larvae in the soil. The nematode referred to, DD-136, is self-perpetuating in the soil and survives on other soil insects in the absence of white-fringed beetle larvae.

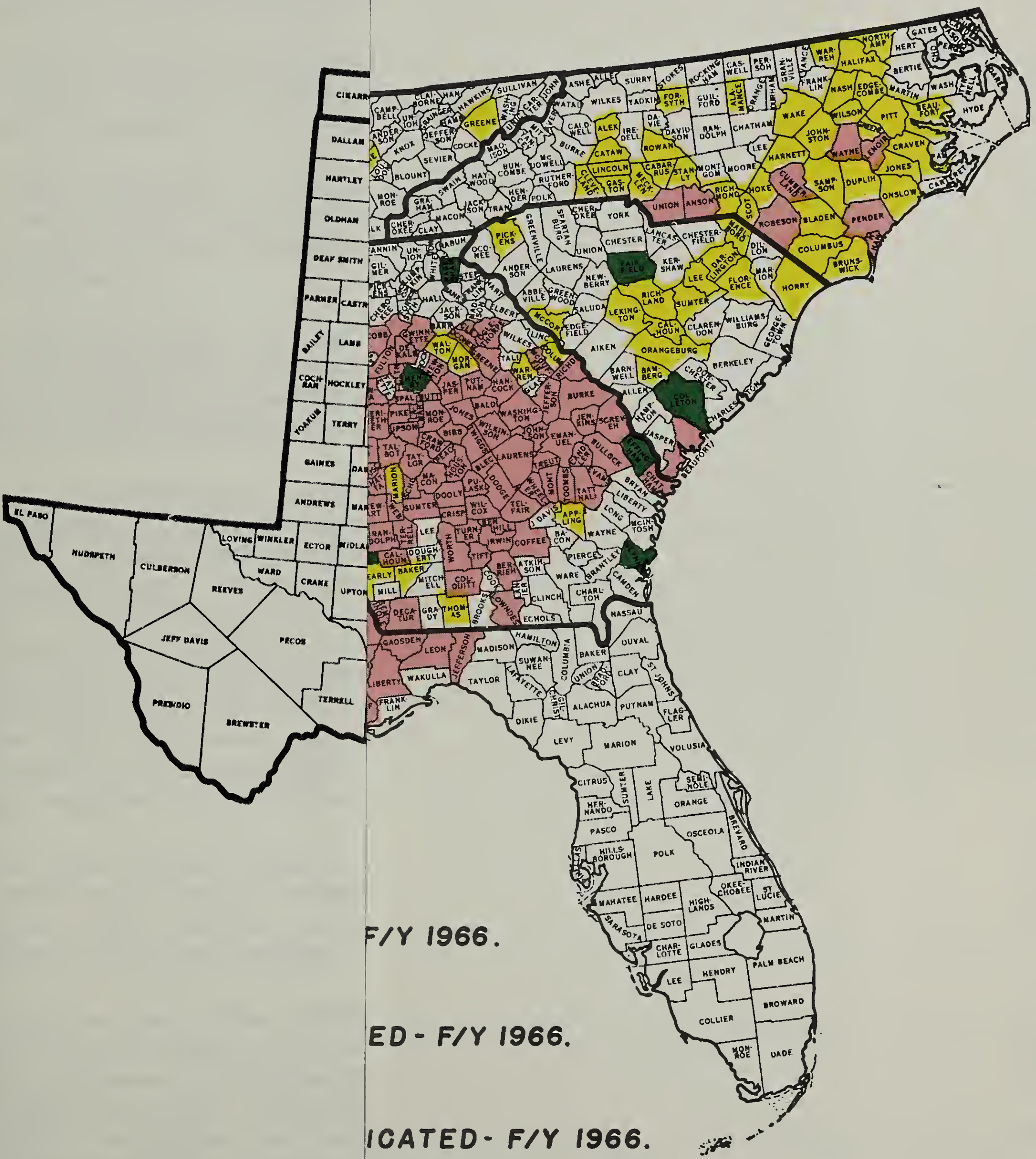
A White-Fringed Beetle Methods Improvement Laboratory has been organized to work with the Research Investigations Laboratory and test developments in a large-scale field test. Plans are complete for field-testing four adulticides during the adult season. These include emulsifiable concentrates, suspensions, oil solutions, and LV malathion applied with ground equipment.

Table 21.--White-Fringed Beetle

State	Survey and detection		Control	Regulatory						
					Properties inspected			Pesticide treatments		
								Soil		Foliage
	Properties surveyed	Acres infested	Acres treated	Commodity treatments (visits)	Nursery	Industrial	Other	Acres	Cu. ft.	Acres
Ala.	11,717	47,927	27,643	170	1,141	661	1,183	14,101	...	6,481
Ark.	3,948	810	1,516	...	3	12	169	43	...	613
Fla.	1,690	8,706	...	...	59	204	54	563	...	...
Ga.	4,011	29,314	1,103	903	593	1,459	4,963	1,396	20,049	...
La.	4,687	9,673	1,433	70	790	336	726	747	245	1,020
Miss.	3,964	6,641	475	74	369	414	82	451	10,158	53
N. C.	13,732	3,991	2,442	332	388	866	381	308	1,890	...
Okla.	10	...	...	...	...	...	...	...	...	...
S. C.	3,886	696	666	8	20	8	22	11	...	...
Tenn.	26,753	10,482	5,478	101	805	233	311	2,018	400	653
Texas	64	...	...	...	...	...	...	...	...	...
Total	74,462	118,240	40,756	1,658	4,168	4,193	7,891	19,638	32,742	8,820

This year damage by white-fringed beetles was quite heavy and very widespread. The cornfield is in south Alabama; the soybean field is at Paris, Tennessee, near the Kentucky line.

L DIVISION



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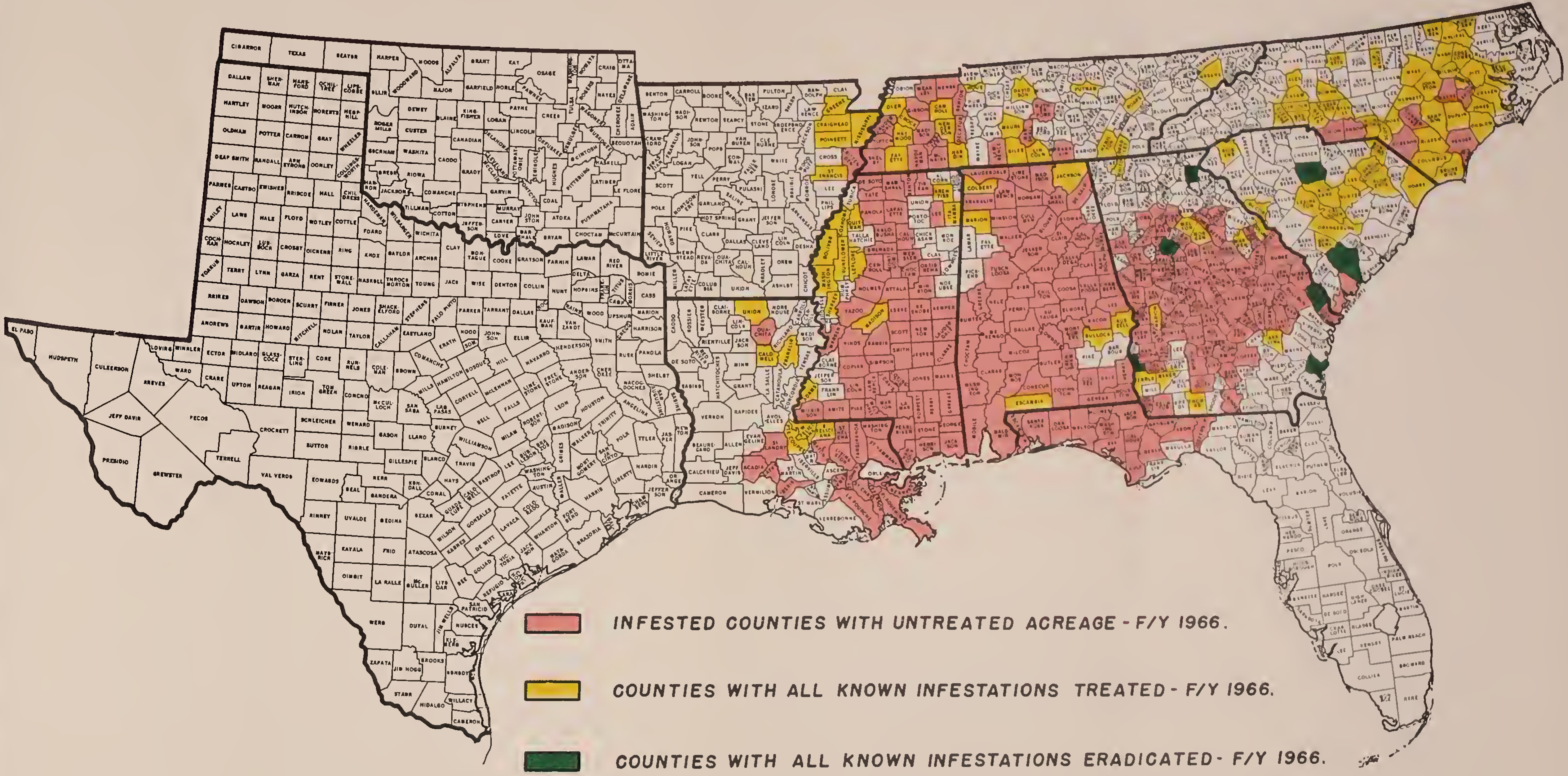
UNITED STATES DEPARTMENT OF AGRICULTURE

AGRICULTURAL RESEARCH SERVICE — PLANT PEST CONTROL DIVISION

SOUTHERN REGION

WHITE - FRINGED BEETLE



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WITCHWEED

Witchweed is a threat to the production of corn, sorghum, sugarcane, rice, and summer grains. These crops have a value in excess of $6 billion in the growing areas of the United States. In North Carolina and South Carolina where the parasite has been found, corn and sorghum production is valued at $136,144,000.

Presently, infestations are recorded in 24 counties in North Carolina and 11 counties in South Carolina. This is a contiguous area of the coastal plains.

In fiscal year 1966, all States in the Southern Region were surveyed for witchweed. Survey in the Carolinas was confined to infested counties or those adjacent thereto. In previous years, all counties were surveyed intensively.

In North Carolina, in eight of the peripheral counties (representing one-third of the infested counties) no new farms were found infested. Concentrated survey within the more generally infested area revealed 496 additional properties.

In South Carolina, one new county was found infested. This infestation involved 5 acres of a cornfield on one farm, which is located only a few miles from an adjacent infested county. In the infested counties, 165 farms were added to the infested area.

All 2,4-D control was applied under contract. Postemergence spraying was accomplished on 522,519 aggregate acres. Witchweed kill was excellent. Increased general weed control by farmers assisted in ridding the soil of witchweed seed. In peripheral counties where witchweed infestations are small, local contractors were employed to apply methyl bromide to isolated infestations in seven counties. It has been proved that the gas gives complete kill of witchweed seed when it is drilled into the soil with chisel applicators and the soil is covered for 48 hours with polyethylene. It is hoped that continued progress in reducing witchweed infested areas will make it possible and practical to clean up remaining spot infestations in more and more counties by use of methyl bromide fumigation.

State and Federal inspectors enforced existing regulations to prevent spread of witchweed through movement of soil, equipment, and other articles. Fumigation, high pressure washing, steam cleaning, and heat treatment of soil comprise the main methods of certification.

During the year, the number of processing plants has increased, especially those plants handling fresh vegetables. After the regulated articles have been processed at designated plants, they are free to move in the normal channels of trade. The cooperation extended to Division personnel by growers, handlers, and buyers has enabled inspectors to fully enforce the quarantines with a minimum of problems.

An increased effort was made to reach more of the general public concerning quarantine regulations. Articles in local newspapers, spots on radio and TV, and dissemination of printed material through Extension personnel proved very effective.

The Methods Improvement Witchweed Laboratory above was established in 1959. It is located on the grounds of North Carolina Border Belt Tobacco Research Station, Whiteville, North Carolina.

Twin quonset buildings provide adequate space for Crops Research Division and Methods Improvement staffs with supporting subprofessionals. The two headhouses on the right support two large separate greenhouses.

The greenhouses are used for testing and screening candidate herbicides in flowerpot tests, hydroponically growing cotton plants for production of witchweed seed germination stimulant, and determining resistant varieties of grain. The two greenhouses afford a method of separating the use of high and low volatile materials.

To support the screening tests from the greenhouses and laboratory, two field stations are operated--one at Little Rock, South Carolina, and one at Evergreen, North Carolina. Plot size ranges from one-tenth of an acre to several acres.

Research conducted by Crops Research Division at the witchweed laboratory includes physiology of witchweed seed germination and seed dormancy, stimulation of seed germination, host-parasite relations, and evaluation of chemicals for witchweed control. A research grant was awarded to Research

Triangle in North Carolina to isolate and identify the witchweed seed germination stimulant.

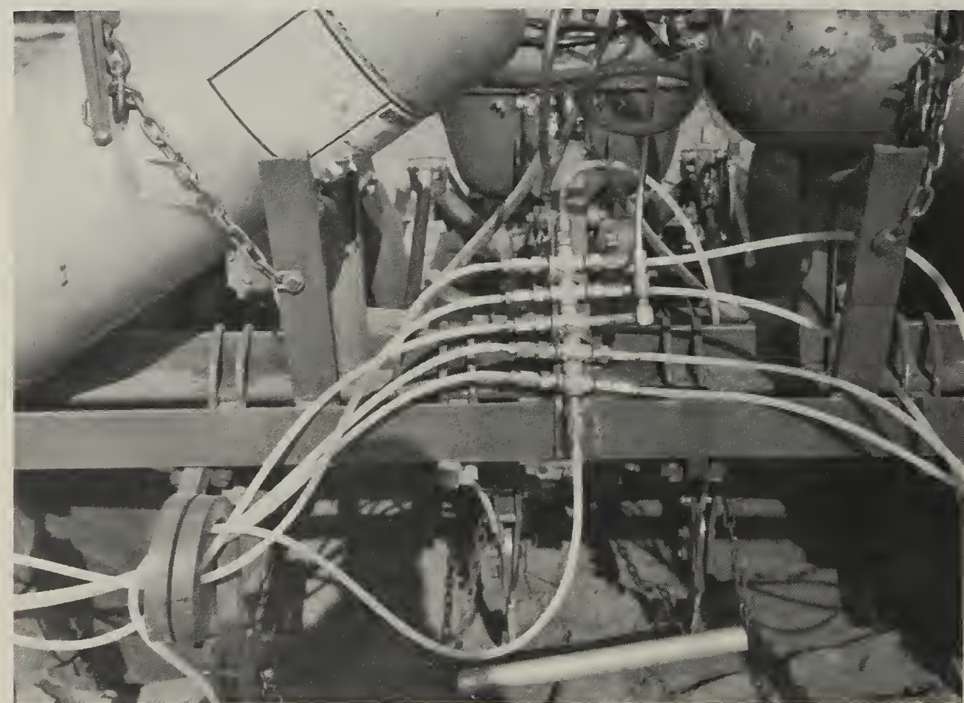
Methods Improvement functions include direct chemical control, crop rotation, catch crop use, grass control in nonhost crops, and herbicide monitoring. Regulatory investigations are conducted to determine methods of crop and equipment decontamination, seed populations, and quarantine requirements.

An aggressive program is in operation to develop a method of witchweed control in nonhost agricultural crops. Several herbicides used by farmers for control of crab grass and weeds in cotton and soybeans show encouraging results against witchweed. The herbicide Treflan is used extensively by farmers in cotton and soybean production and, with slight alteration of application and dosage, shows promise in preventing growth of crab grass for an entire season. It also has a possible use in corn, applied at lay-by time. Other nonhost crops under study are sweetpotatoes, watermelons, cantaloupes, cucumbers, and most garden vegetables. The prevention of witchweed seed development in the nonhost crops will increase the annual treatment area by 66 2/3 percent, if corn is considered to occupy one-third of the agricultural crop acreage.

Table 22.--Witchweed

State	Survey and detection		Control	Regulatory			
	Properties		Acres treated	Commodity treatments (visits)	Properties inspected		
	Surveyed	Infested			Nursery	Industrial	Other
Alabama	2,145	...	...	...	...	...	...
Arkansas	521	...	...	...	...	...	...
Florida	820	...	...	...	...	...	...
Georgia	366	...	...	...	...	6	...
Louisiana	1,249	...	...	...	...	...	...
Mississippi	656	...	...	...	...	...	...
North Carolina	47,599	496	413,988	2,891	180	5,956	16,016
Oklahoma	443	...	...	...	...	...	...
South Carolina	13,143	165	108,531	3,123	10	2,546	12,155
Tennessee	664	...	...	...	...	...	...
Texas	1,084	...	...	...	...	...	...
Total	68,690	661	522,519	6,014	190	8,508	28,171

Tractor-mounted soil fumigation equipment used to eradicate witchweed seed from cultivated farmland.



Details of methyl bromide feed lines to individual shank applicators. Shanks penetrate soil to 6- to 8-inch depth.

Polyethylene tarp is placed over fumigated area and held 48 hours. Disk on left seals tarp with soil; wheel on right presses glued edges of tarp for seal.

Fumigated and tarpaulin-covered field.

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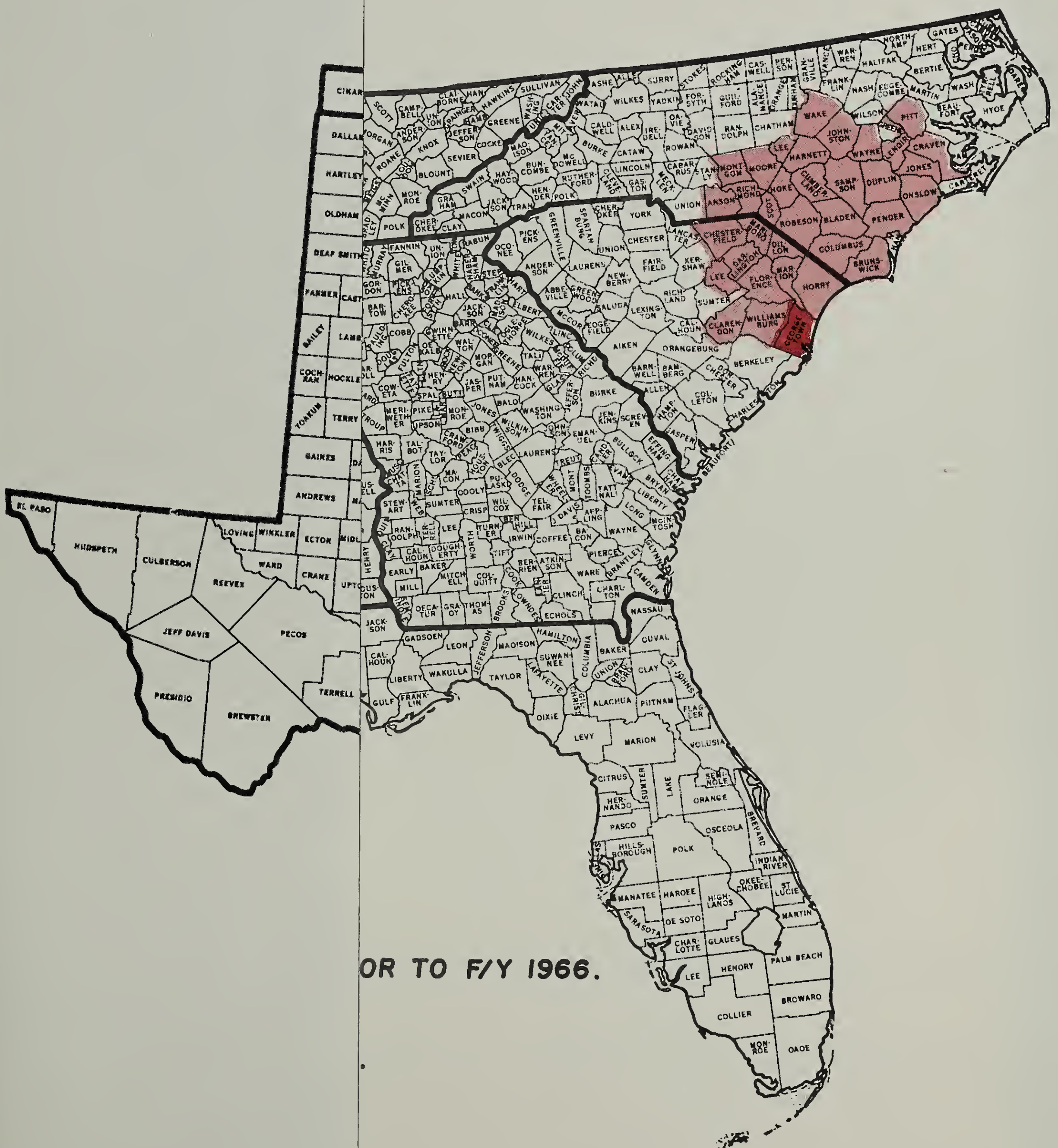
OL DIVISION



OR TO F/Y 1966.

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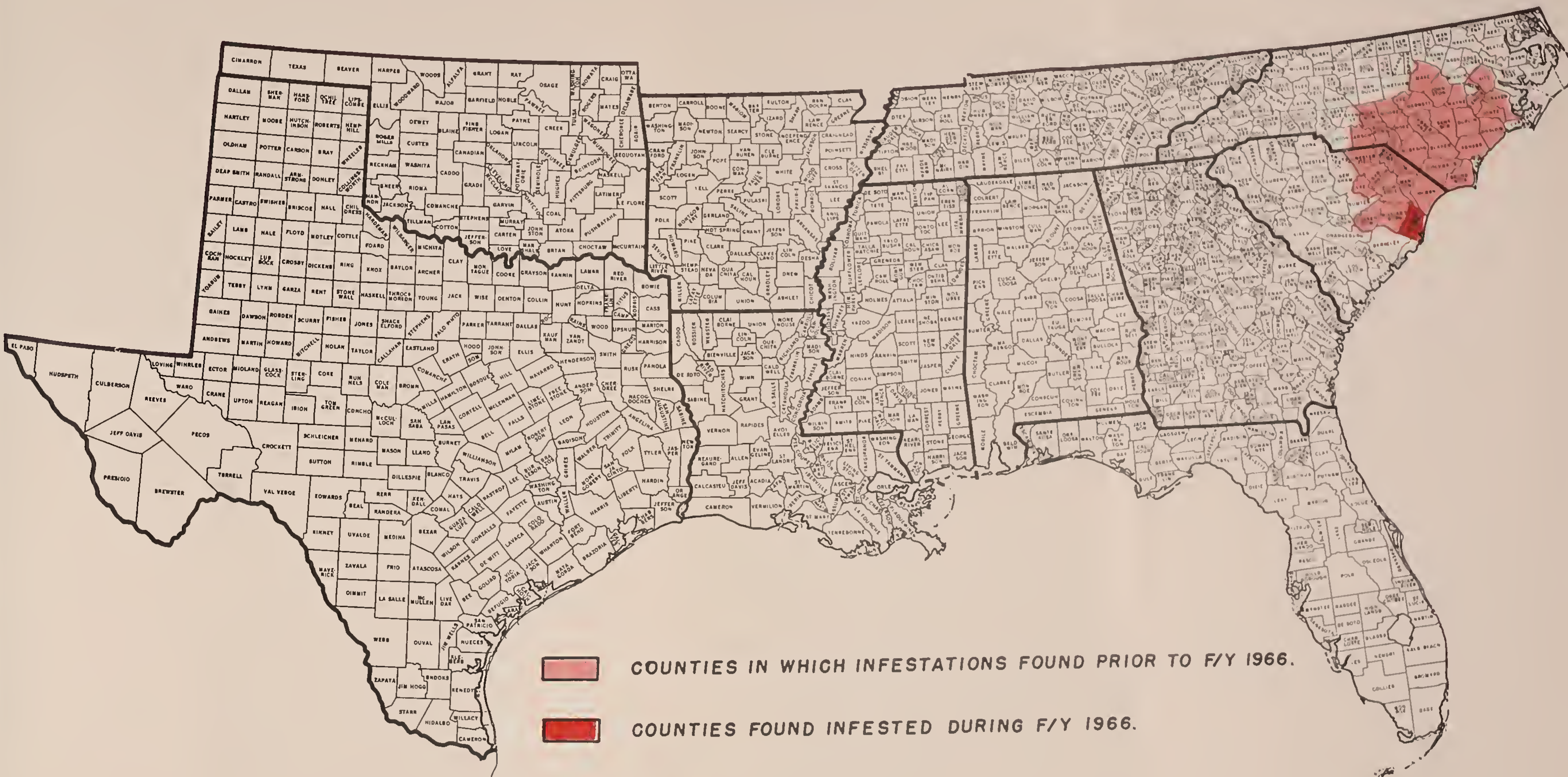
UNITED STATES DEPARTMENT OF AGRICULTURE

AGRICULTURAL RESEARCH SERVICE — PLANT PEST CONTROL DIVISION

SOUTHERN REGION

WITCHWEED



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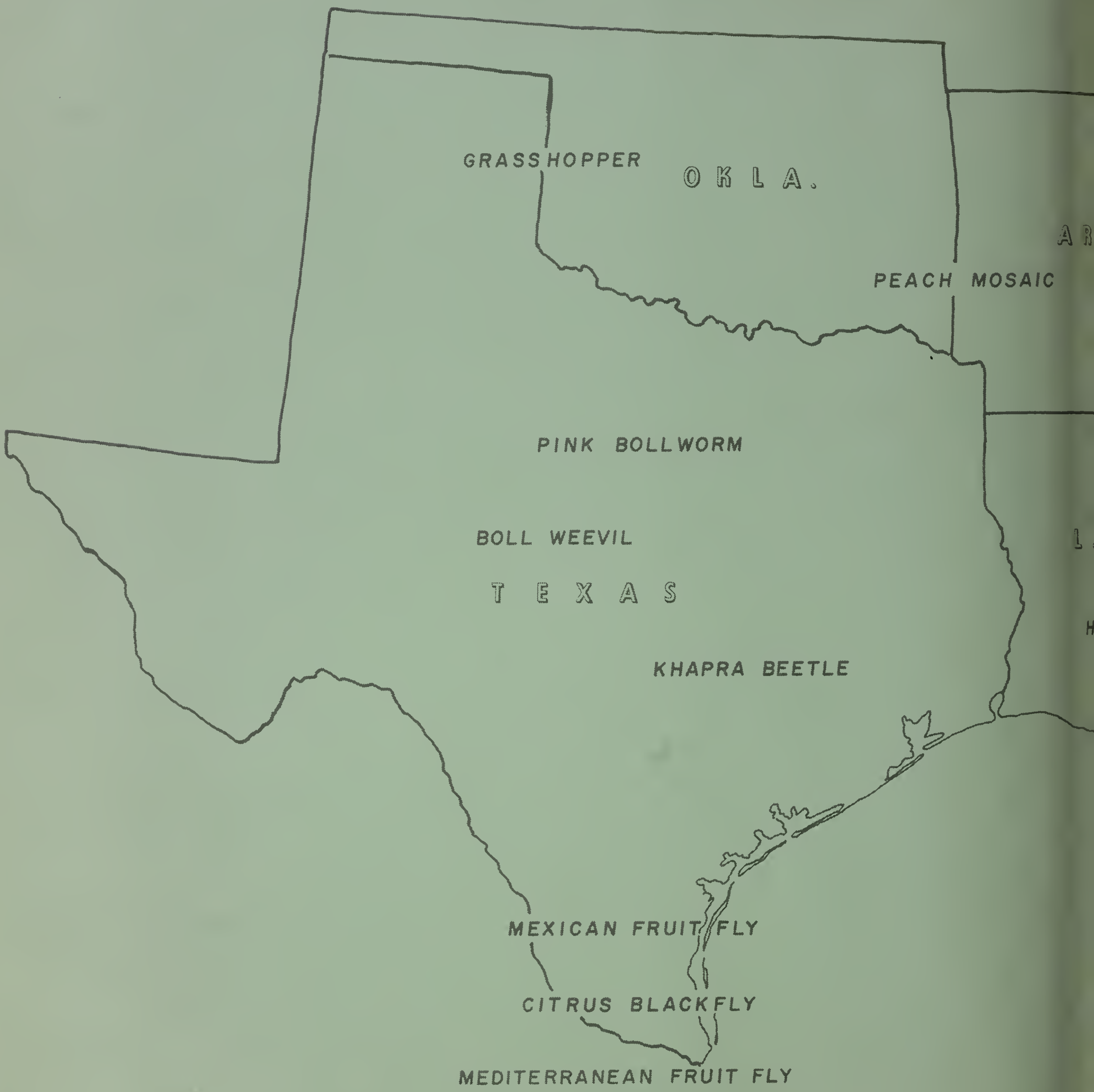

GRASSHOPPER
OKLA.
PEACH MOSAIC
PINK BOLLWORM
BOLL WEEVIL
TEXAS
KHAPRA BEETLE
MEXICAN FRUIT FLY
CITRUS BLACKFLY
MEDITERRANEAN FRUIT FLY

PART VI

PLANT PEST CONTROL

COOPERATIVE PROGRAMS

WESTERN REGION

FISCAL YEAR

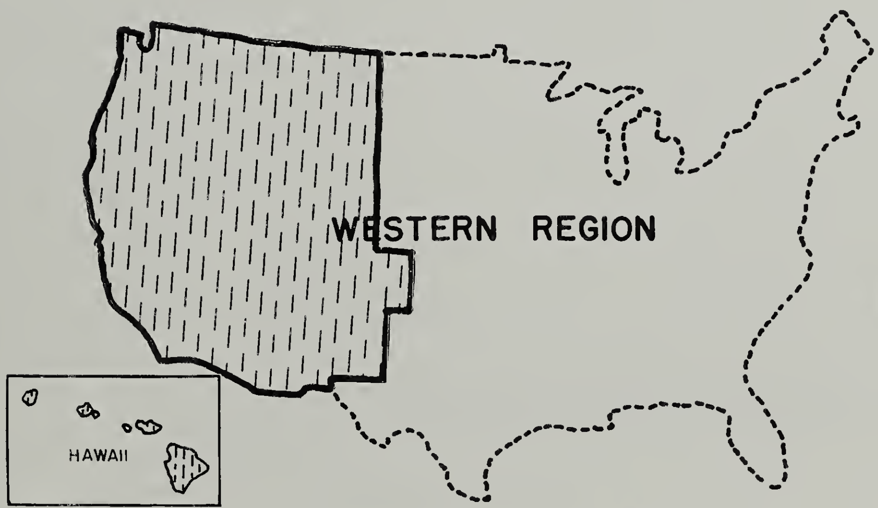
1966

UNITED STATES DEPARTMENT OF AGRICULTURE
AGRICULTURAL RESEARCH SERVICE
PLANT PEST CONTROL DIVISION

PLANT PEST CONTROL

COOPERATIVE

PROGRAMS



FISCAL YEAR

1966

OAKLAND, CALIFORNIA

OCTOBER 1966

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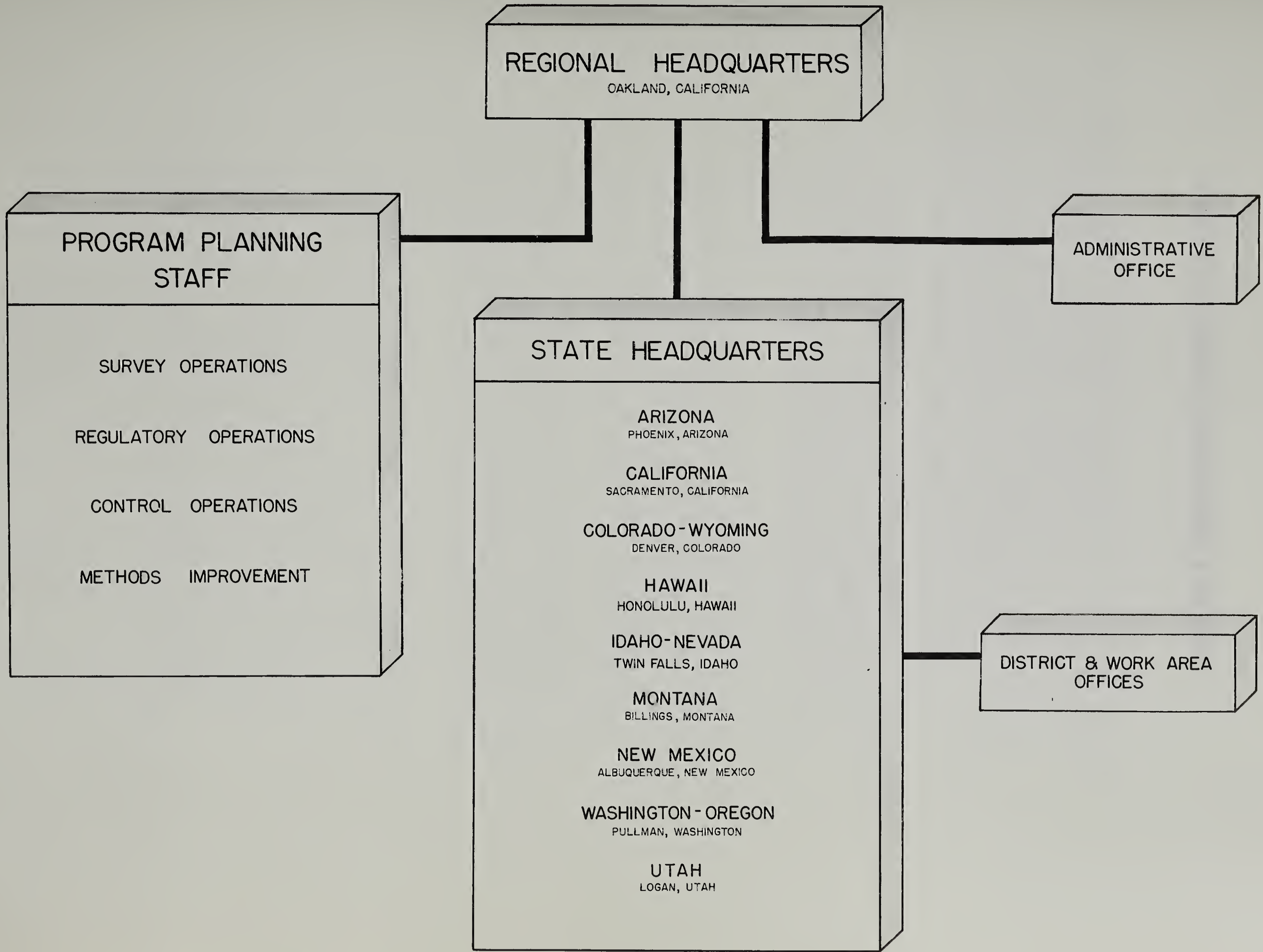
WESTERN PLANT PEST CONTROL REGION



Plant Pest Control Cooperative Programs

The Western Region Cooperative Programs have presented most of the problem facets which can embellish well, though sometimes hastily planned, action work. Despite changes in direction, momentum, and duration, due to cooperator attitudes, money, weather, and other influences, our meagerly manned group has averted some definitely menacing pest threats to agriculture and kept the Division's work in the West on schedule. Particularly noteworthy incidents would include--

1. The unexplained khapra beetle occurrence in California. A large Imperial County cattle feeding establishment, theretofore not infested, was fumigated despite an average livestock population of some 15,000 head. This was accomplished with minimum inconvenience to the owners.

2. Very extensive grasshopper rangeland infestations, especially in Montana and New Mexico, were suppressed with a minimum of delay and difficulty. The restrictions on insecticides of choice were not so hampering as in recent years. LV Malathion applications achieved a gratifying uniformity of good results.

3. The pink bollworm spread rapidly westward into California, where early season moth catches augured trouble as the season progressed. This apprehension has been realized. An accompanying misfortune was the manifest serious buildup of the pest in central Arizona.

   Our survey plans were threatened and embarrassed by the reduction of scarce natural lure material and the failure of synthetic (propylure) lure to live up to expectation. By combining the meagre supply of natural lure with a volumetrically increased quantity of synthetic material used in traps, we finally got occurrence definition results. Diligent Methods effort greatly aided the solution of this problem. This effort included successful trial and adoption of night baiting, which minimized evaporation and diurnal dissipation of the lure.

3a. The cotton weevil picture brightened in California since only a single specimen was recovered in that state this year.

4. In Idaho beet leafhopper control involved more acreage than was treated in any previous year. The suppression prevented migration into valuable adjacent crops.

5. On February 1, 1966, a formal Survey Agreement was entered into with Hawaii. This brought our contract states to seven. In cooperation with Plant Quarantine Division we have placed--and they are operating--a number of light traps at strategic ports of entry, international airports, and MATS stateside terminals.

6. The Japanese beetle has apparently been eradicated from the Western Region. The negative 3-year span following last occurrence of the pest was concluded in 1966. Trapping operations were modified to detection level.

7. The golden nematode survey, triggered by the Vancouver Island, B.C., discovery of the pest, resulted in intensive survey of soil from all commercial fields in states of the Region where seed from Vancouver Island had been used. Results were negative.

8. The proliferating operations of the Environmental Impact Program in the Region have included 2 new special soil study areas, 7 new "low pesticide usage" sampling areas, and 4 new "no pesticides usage" sampling areas.

Barberry Eradication

Cooperative barberry eradication was conducted in Colorado, Montana, and Washington.

In Colorado the majority of survey and control operations was conducted in four counties in the southwestern part of the state; namely, Archuleta, La Plata, Montezuma, and Montrose. These counties are in the area of the state which continues to be heavily infested with native barberry, Berberis fendleri. The survey and control work was done as "re-work" on properties surveyed at least 3 years ago. Other areas of Colorado were inspected for introduced barberry, Berberis vulgaris, and its horticultural varieties. These areas are on a "re-work" basis.

A total of 224 properties and 94 square miles was surveyed, with 57,259 bushes found and destroyed on 136 properties. Sixteen properties were inactivated on the basis of two successive negative checks.

Montana state funds for barberry eradication became available in July 1965. On September 1, a three-man crew paid from state funds began a systematic, intensive survey of the Judith River area of Fergus County. During the ensuing 3 months, a total of 6 square miles of heavy brush area was covered. Forty-five small, medium, and large bushes were found and destroyed. In 1964 the owner of the infested area used heavy equipment to clear the brush from at least 360 acres in the center of the barberry area. It is estimated that he destroyed some 100 barberry bushes.

PPC personnel checked the Clark Fork area of Yellowstone and Carbon Counties during the summer and fall months, finding 38 barberry bushes in an area of some 300 acres.

Rework surveys were conducted during the fiscal year in seven eastern Washington counties; namely, Benton, Douglas, Franklin, Grant, Okanagan, Spokane, and Stevens. The work schedule was drastically changed in mid-year to accommodate to the reduced allotments for travel.

As a result, the majority of survey done in the September 1965-March 1966 period was in the Cheney escape area of Spokane County, which did not involve overnight travel for the crews. During the spring of 1966, some relief was given from travel restrictions, and

survey was resumed on a normal schedule, principally in counties in the middle of eastern Washington. These counties originally had light infestations of barberry bushes, and the survey problems have not been difficult. During the fiscal year 594 old barberry locations were reinspected, and 60 square miles of territory were intensively foot-scouted. Of the old properties inspected, 62 were found to have newly grown barberry bushes. At these old locations, 698 rust-susceptible bushes were destroyed, and on the 13 newly infested properties, 1,019 bushes were destroyed.

Rust surveys were made in the several states, with no serious damage from stem rust or leaf rust being detected. Infection ranged from zero to a trace.

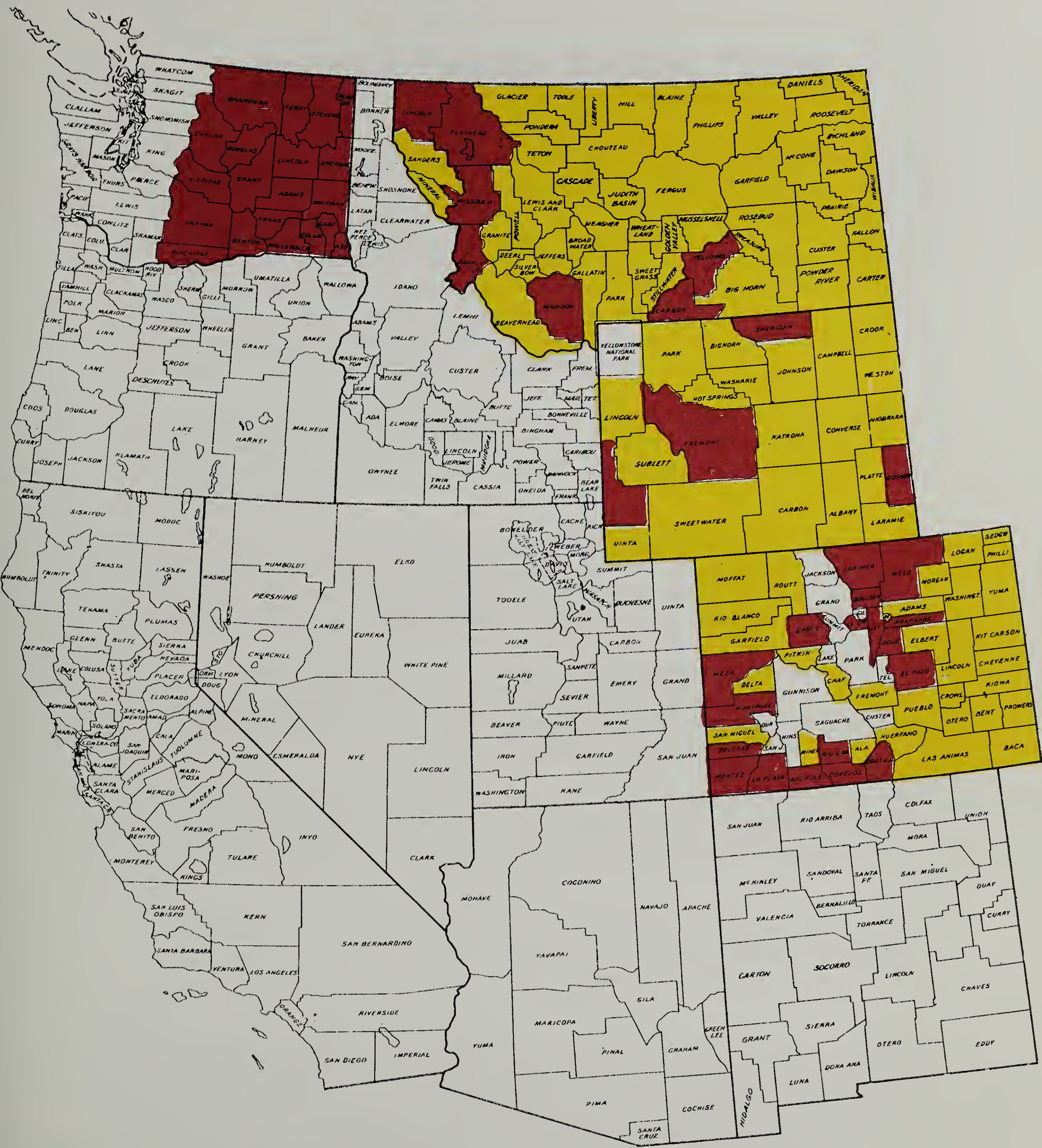
Nurseries of record that ship Berberis, Mahoberberis, and Mahonia interstate were inspected in accord with the provisions of Black Stem Rust Quarantine No. 38. Seed dealers were also inspected in California, Montana, and Washington. By states, the nursery and dealer inspections are shown in the following table.

State	Nurseries Inspected Number	Nurseries Inspected Acres	Other Properties Inspected
California	43	1,445	1
Colorado	7	127	1
Montana	5	43	2
Oregon	44	1,346	4
Utah	5	77	0
Washington	4	26	2
Totals	108	3,064	10

Fiscal Year 1966

State	Survey and Detection			Control	Regulatory		
	Sq. Mi. Surveyed	Properties Reinspected	No. Properties Found With Bushes	Plants Destroyed	Nurseries Inspected		Other Properties Inspected
					Number	Acres	
California	0	0	0	0	43	1,445	1
Colorado	94	224	136	57,259	7	127	1
Montana	5	6	3	83	5	43	2
Oregon	0	0	0	0	44	1,346	4
Utah	0	0	0	0	5	77	0
Washington	60	594	75	1,717	4	26	2
Wyoming	1	2	0	0	0	0	0
Total	160	826	214	59,059	108	3,064	10

BARBERRY ERADICATION
1966 FISCAL YEAR



Counties requiring some work.

Counties on maintenance.

UNITED STATES DEPARTMENT OF AGRICULTURE
AGRICULTURAL RESEARCH SERVICE
PLANT PEST CONTROL DIVISION
WESTERN REGION
OCTOBER 1966

Agricultural Pesticides Monitoring Program

Following the assignment of our chemist to the Yuma field laboratory in late FY 1965, considerable improvement in sample handling and processing was promptly evident. A huge backlog of unprocessed samples was gradually reduced, and by mid-year this phase of our DIAP activities had been brought up to date. Some improvements were made in laboratory, storage, and office facilities; commercial storage was arranged for biological reference samples; soil reference samples were cut to half-gallon size; and storage of soil reference samples was rearranged.

One of the two square-mile intensive study areas at Yuma (WYUB) was discontinued, facilitating more intensive sampling of WYUA and permitting further expansion of sampling sites elsewhere in the Western States.

By the end of the fiscal year, we were sampling five special soil study areas twice annually, four no-use of pesticides areas annually, and seven low-use of pesticides areas annually, in addition to WYUA. Specifically, these areas are as follows:

Low-use-treated once or twice for grasshoppers	1 - Phillips County, Montana 2 - Lincoln County, Idaho 3 - Klamath Falls County, Oregon 4 - Fremont County, Wyoming
Low-use-treated once or twice for forest pests	5 - Lincoln National Forest, New Mexico 6 - Coconino National Forest, Arizona 7 - Stanislaus National Forest, California
No-use	8 - Cache National Forest, Utah 9 - Ravalli Wildlife Refuge, Montana 10 - San Andres Wildlife Refuge, New Mexico
Special soil study areas	12 - Yuma Mesa (citrus) - Yuma, Arizona 13 - Weld County, Colorado (vegetables) 14 - Wenatchee, Washington (orchards) and Quincy-Moses Lake, Washington (vegetables) 15 - Klamath River drainage - Tulelake, California (potatoes-barley) 16 - Kern County, California (cotton-vegetables)

Of the latter group, numbers 13, 14, and 16 are in cooperation with State Public Health Departments, under their monitoring contracts with USPHS, and number 15 is in cooperation with a USPHS monitoring project.

In the fall of 1965 sugar beet samples were taken at two locations in the Weld County, Colorado, study area in connection with pesticide translocation studies. The latest addition to the study sites was the Kern County, California, area, sampled for the first time in the spring of 1966.

The third summer's work is under way in our program monitoring contract with the Department of Entomology of the University of Wyoming. This project is an attempt to evaluate on a long-term basis the impact of technical Malathion grasshopper spraying on nontarget arthropods. The third season final report on this program is due in April 1967.

For the second summer we participated in a cooperative endeavor with the Universities of California (Riverside, Davis, and Berkeley) designed to evaluate the impact of technical Malathion on honeybees. This season this work was confined strictly to the drift aspect of such spray treatments.

Golden Nematode

With the discovery of golden nematode on Vancouver Island, B. C., Canada, in June of 1965 and the fact that seed potatoes had been moved from the Island to the Mainland, thence to the States, it was considered important to survey for the pest in Western Region states. A review of records over the past 10 years indicated that numerous shipments of seed potatoes from the Island had been made to seven Western States.

At all grader and storage sites receiving potatoes grown on fields planted with British Columbia seed, soil samples were collected for examination. A total of 3,000 samples from 793 properties, representing more than 30,000 acres of potatoes in California, Idaho, Montana, New Mexico, Oregon, and Washington, was collected and processed. No golden nematode cysts were found.

Soil washing stations were operated at Pendleton, Oregon; Twin Falls, Idaho; and Phoenix, Arizona. Processing of soil samples, as well as their collection, was done by PPC and cooperator personnel.

GOLDEN NEMATODE

Fiscal Year 1966

State	Survey and Detection				Control	Regulatory
	Inspected		Infested		Acres Fumigated	Potato Grading Station Inspections
	Properties	Acres	Properties	Acres		
California	278	11,746				
Idaho	311	9,980				
Montana	128	5,657				
New Mexico	57	1,443				
Oregon	10	7,065				
Washington	12	3,776				
Total	796	39,667				

Grasshopper Control

Nearly a million and a half rangeland acres in the Region were sprayed to control grasshoppers in 1966. The largest single program undertaken was in Montana, where more than one-third of the total was treated. Other states in the Region where cooperative programs were undertaken were California, Idaho, New Mexico, Oregon, and Utah.

In eastern New Mexico damaging infestations developed on an estimated half million acres of rangeland. The control program in Lea, Eddy, and Chaves Counties was started on June 20, but high winds and abundant rain extended the completion date to July 14. The widespread infestation in New Mexico was not entirely unexpected, but we did not anticipate the amount of rancher cooperation that developed. Grasshoppers and drouth so affected the available range in the state that it was important to save every bit of grass possible. In spite of the control work and abundant though late moisture, some ranchers were forced to feed their livestock early in the summer. Control results averaged very good, kills being estimated at more than 90 percent. This was the first control program in several years in New Mexico, but it appears that an even larger acreage will have economic infestations next season, and a control program is anticipated.

Drouth in south central Montana was severe and this coupled with widespread, though sometimes spotted, grasshopper infestations was a severe threat to grass and other forage. Indian users on the Northern Cheyenne Reservation requested a control program to protect the range and to help reduce the threat for the coming year. More than one-half million acres were sprayed with 8 ounces of Malathion. With few exceptions good control was obtained.

In northern Montana there were also high populations of grasshoppers, but moisture conditions were such that a good stand of grass resulted, and damage by grasshoppers was minimized by the good growing conditions. The only control work done by the Division in this area was 1,000 acres of roadsides sprayed on the Rocky Boy Reservation to protect some bordering Indian lands.

<u>Melanoplus</u> <u>sanguinipes</u> was the dominant species in Montana in 1966, and many flights were observed by Division personnel and ranchers during late July.

Unusual conditions prevailed in Idaho during the early spring, and grasshoppers hatched at least 5 weeks early. There then followed a very dry period, and many of the young grasshoppers died from what

is believed to have been the effects of drouth and attack by sarcophagid and nemestrinid parasites. Some areas originally scheduled for control were dropped from the program because of this population reduction. The population reduction persisted throughout the summer, and only limited areas were found to be infested at the time of the adult survey. The total acreage sprayed during the season was just over 200,000. This was the least for several years in Idaho.

State cooperation in Wyoming was reduced to the provision of several personnel only because there was no available state money to assist in defraying contract costs. This was a major factor in the control acreage reduction in 1966. Only 30,000 acres of private lands were sprayed under the cooperative program.

At its meeting during the State Fair in August, the Wyoming State Board of Agriculture voted to discontinue its request for funds to cooperate in grasshopper control in the future. What effect this will have on the work in Wyoming is problematical, but it is presumed that there will be only a minimum amount of control work undertaken on private lands except during periods of very severe outbreaks.

For several years there have been early requests for control work in northeastern Oregon, but each has been withdrawn at sign-up time. This year the infestation was so severe that all cooperators eagerly joined in the program, and a total of over 50,000 acres was treated in two programs. The greater amount of work was done in Wallowa County, with the remainder being done in Baker County. Two of the areas in Wallowa County were on the benchlands in the steep canyons along the Snake and Imnaha Rivers. Personnel making initial surveys in these rough areas last year required several days for the task when they used saddle horses to get into the benchlands. This year for the initial nymphal surveys and the kill check, the supervisor was flown into the infested areas by helicopter. This proved to be a much more efficient and inexpensive mode of accomplishing the work. The kill check revealed 1,800 acres on which poor kill had been obtained. This acreage was resprayed, with PPC furnishing Malathion and ranchers the application costs.

In Baker County 12,960 acres were sprayed, with PPC, State of Oregon, ranchers, BLM and Forest Service cooperating. Good results were obtained from this spray job. Moderate to heavy infestations of grasshoppers on BLM lands were present in other areas of Baker County and in Grant and Malheur Counties, Oregon, totaling more than 400,000 acres. There were no requests for work in the areas, however.

Utah's grasshopper infestations were not so widespread in 1966 as they were during the previous year. Work was necessary, though, on nearly 21,000 acres. The work was done at three locations with 4,320 acres being sprayed on the Dixie National Forest in Garfield County, 3,456 acres in the Cedar Mountain area of Iron County, and 12,960 acres of Indian land on the Uintah and Ouray Indian Reservation in Uintah County. All of this work was done by the same pilot and plane, and good results were obtained in all cases. Most of the grasshoppers involved were either Camnula or Melanoplus sanguinipes, and we believe that to promptly control these migratory grasshoppers in these limited areas will do much to forestall spread and a more serious outbreak.

Two small areas were treated in California--one was on the Tulelake Refuge and the other in the Shinn Peak area of Lassen County. The latter was BLM land and was a reseeded burn. This was a very rough area and was treated by helicopter.

In the remaining states of the Region, grasshoppers were either crop or local problems, or did not increase to a point that they threatened forage.

Two large-scale methods improvement grasshopper control projects were conducted during the 1966 season. During June, southwest of Lovington, New Mexico, 37 half-section plots were treated with technical Malathion to evaluate effectiveness of three different nozzles and two different nozzle directions. Spraying System's 8010 and 8003 and Buffalo Turbine's Mini Spin were each used at a 45° angle back and down and at a straight back position. Six replicates of each were applied. A trial run of a Woodbury Chemical two-pound per gallon oil and water "Sevin concentrate" at a half-gallon (8 oz.) per acre rate was also evaluated.

In July and August in the vicinity of Lusk, Wyoming, two methods improvement projects were conducted--one using Malathion and comparing heights of flight, temperature, wind, and rainy conditions and the other involving comparisons of various insecticides. The Division's new Cessna spray plane was used in this work. On these two projects a total of 17,175 acres was treated. Reports on these projects will be released by the ENT Laboratory at Bozeman, Montana.

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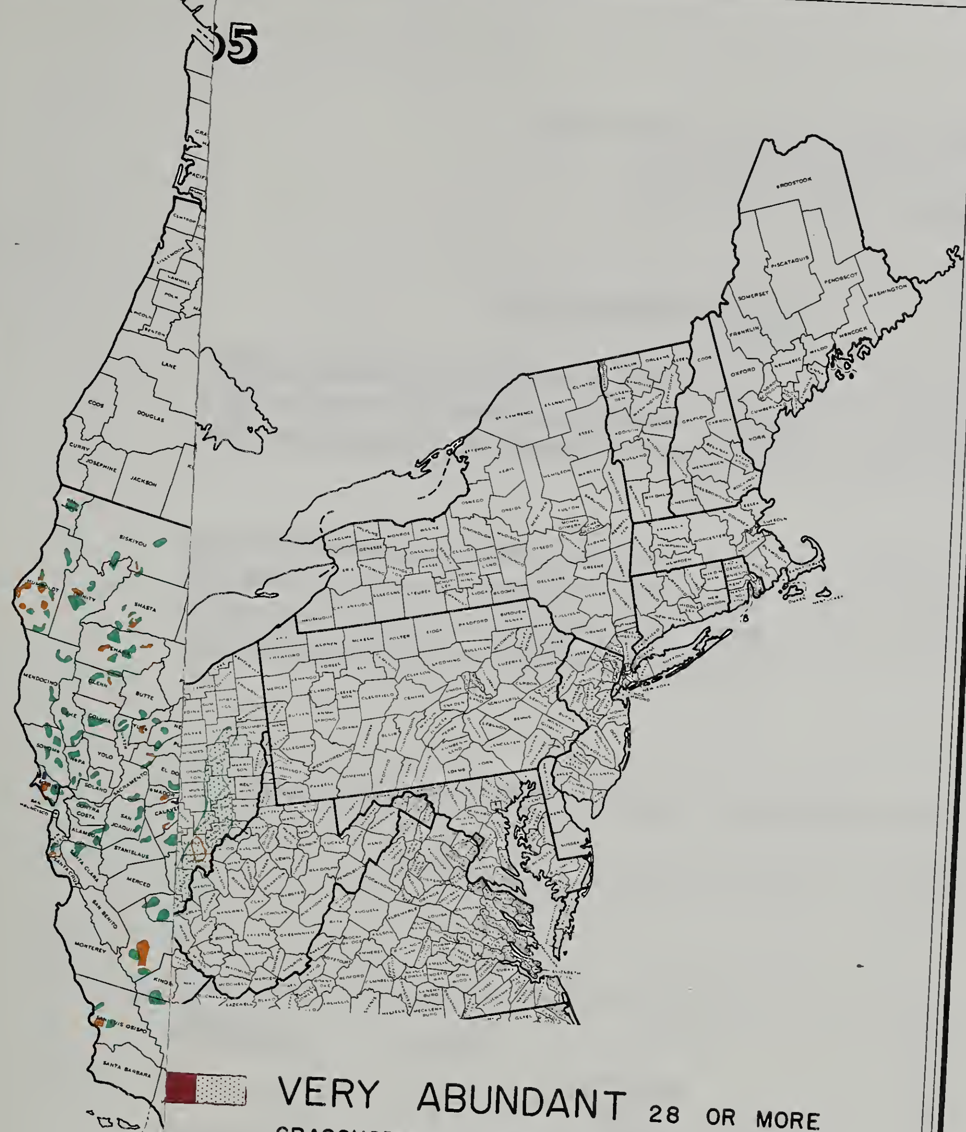

VERY ABUNDANT 28 OR MORE GRASSHOPPERS PER SQUARE YARD

ABUNDANT 15-27 GRASSHOPPERS PER SQUARE YARD

MODERATE 8-14 GRASSHOPPERS PER SQUARE YARD

LIGHT 3-7 GRASSHOPPERS PER SQUARE YARD

SOLID COLORS - RANGELAND INFESTATIONS

STIPPLED COLORS - CROPLAND INFESTATIONS

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TAILED INFORMATION CONCERNING THE GRASSHOPPER PROBLEM SPECIFIC AREAS CAN BE OBTAINED FROM STATE PEST NTROL OFFICIALS, COUNTY AGENTS, AND PLANT PEST NTROL DIVISION PERSONNEL.

PREPARED IN PPC, ARS, USDA
DECEMBER 1, 1965

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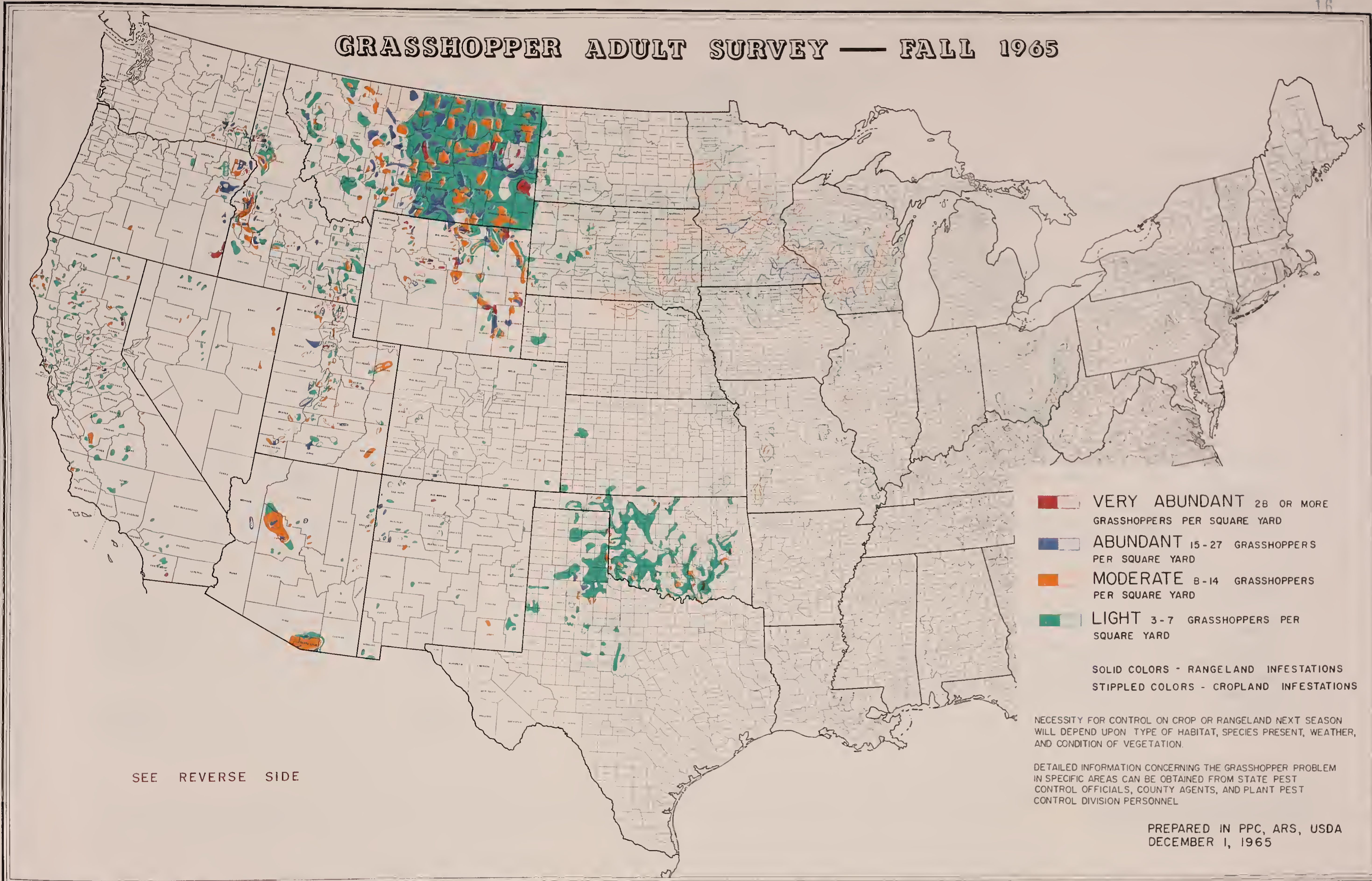
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REGIONS, FALL 1965

Blue and Red)

	LANDOWNERSHIP - ACRES		TOTAL ACRES
	Private and State	Public Domain	
ico	16,500	15,400	31,900
	280,700	320,000	600,700
	97,865	117,760	215,625
ton	246,000	--	246,000
	1,970,100	371,900	2,342,000
a	342,500	--	342,500
	159,600	--	159,600

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GRASSHOPPER CONTROL

State	Survey and Detection	Control
	*Acres Infested	**Acres Treated
Arizona	1,811,200	0
California	127,010	7,040
Idaho	1,567,280	219,490
Montana	9,080,000	555,245
Nevada	49,900	0
New Mexico	31,900	405,480
Oregon	600,700	51,840
Utah	215,625	22,750
Washington	246,000	0
Wyoming	2,342,000	83,716
Total	16,071,615	1,345,561

*1965 fall survey
**Control season 1966

UNITED STATES DEPARTMENT OF AGRICULTURE
Agricultural Research Service
Plant Pest Control Division

TO COOPERATORS:

This map is based upon the results of cooperative grasshopper adult surveys made during the late summer and fall of 1965. The survey reveals where and how many grasshoppers infest an area, and indicates the potential severity of infestations for 1966. Nymphal surveys, made in the spring, determine population densities, and indicate those areas where control may be necessary in 1966.

The infestations in croplands are shown on the map in stippling. Control on those lands will be handled by the farmers with technical assistance from Division and State personnel. The infested range areas, shown on the map in solid colors (orange, blue and red only), total 16,612,455 acres in 13 Western and Midwestern States. Shaded areas on the map are diagrammatic. Within these areas, infestations may be solid or spotted.

RANGELAND GRASSHOPPER INFESTATIONS - ACREAGE BY REGIONS, FALL 1965

(Moderate Populations or Above - Orange, Blue and Red)

REGION AND STATE	LANDOWNERSHIP - ACRES		TOTAL ACRES
	Private and State	Public Domain	
CENTRAL			
So. Dakota	32,250	6,490	38,740
WESTERN			
Arizona	1,274,000	537,200	1,811,200
California	125,010	2,000	127,010
Idaho	468,280	1,099,000	1,567,280
Montana	7,333,000	1,747,000	9,080,000
Nevada	--	49,900	49,900
New Mexico	16,500	15,400	31,900
Oregon	280,700	320,000	600,700
Utah	97,865	117,760	215,625
Washington	246,000	--	246,000
Wyoming	1,970,100	371,900	2,342,000
SOUTHERN			
Oklahoma	342,500	--	342,500
Texas	159,600	--	159,600

The survey was planned and performed by the Plant Pest Control Division, Agricultural Research Service, in cooperation with various State agencies concerned.

GPO 971-930

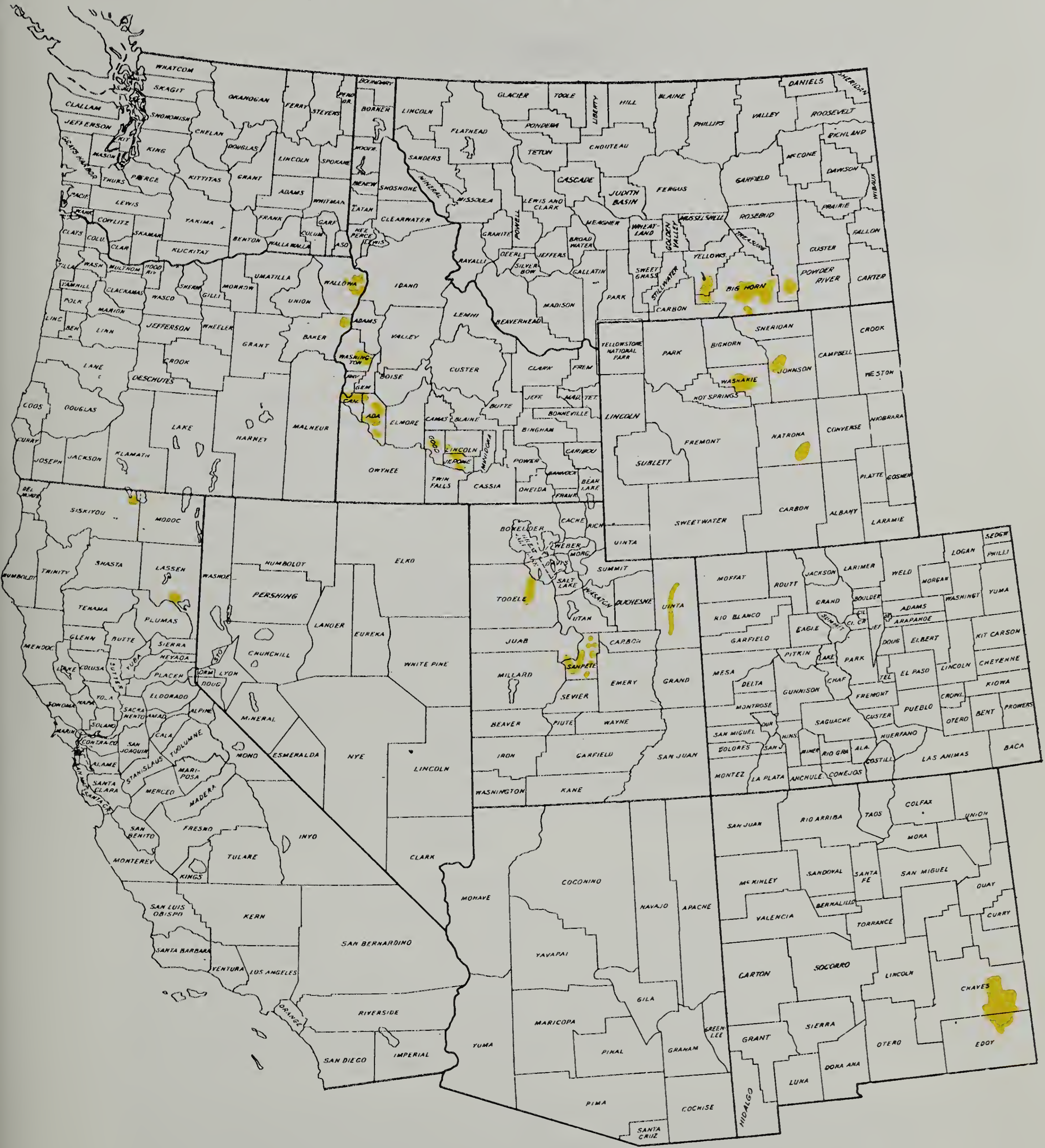
GRASSHOPPER CONTROL

State	Survey and Detection	Control
	*Acres Infested	**Acres Treated
Arizona	1,811,200	0
California	127,010	7,040
Idaho	1,567,280	219,490
Montana	9,080,000	555,245
Nevada	49,900	0
New Mexico	31,900	405,480
Oregon	600,700	51,840
Utah	215,625	22,750
Washington	246,000	0
Wyoming	2,342,000	83,716
Total	16,071,615	1,345,561

*1965 fall survey
**Control season 1966

GRASSHOPPER CONTROL

1966 CONTROL SEASON



Areas cooperatively treated 1966 control season.

UNITED STATES DEPARTMENT OF AGRICULTURE
AGRICULTURAL RESEARCH SERVICE
PLANT PEST CONTROL DIVISION
WESTERN REGION
OCTOBER 1966

Hawaii

The activities of the Plant Pest Control Division in Hawaii have been quite varied.

Division participation in the biological control of the southern green stink bug (Nezara viridula) was terminated December 31, 1965, as the parasites Telenomus basalis (stink bug egg parasite) and Trichopoda pennipes (adult stink bug parasite) had become well established over the state and the stink bug populations reduced to noneconomic levels.

Due to an occasional seasonal rise in the southern green stink bug population, the Hawaii Department of Agriculture has continued to rear parasites on a limited basis, with emphasis on an attempted establishment of a new Japanese egg parasite. They will also try to establish another new egg parasite, Telenomus nakagawai.

Two potential economic pests were introduced into Hawaii this year and have established themselves on the island of Oahu. The black stink bug, Coptosoma xanthogramma, has been found on mauna loa, Jade vine, pigeon pea, and lima beans. This insect has spread rapidly and high populations have developed. No economic damage has been caused; however, the insect is being closely observed so that control measures may be applied if the need arises. The red-shouldered stink bug, Thyanta accera, found on string beans and grasses, appears to be slowly spreading, but populations remain low. The low population density may be attributed to action by parasites that were introduced for biocontrol of the southern green stink bug, N. viridula.

On February 1, 1966, a Cooperative Economic Insect Survey Agreement was signed with the Hawaii Department of Agriculture, the Agricultural Extension Service, the Experiment Station, and PPC. This agreement provides for a 12-month survey period. A Survey Entomologist was selected, and the State Entomologist of the Hawaii Department of Agriculture became the State Survey Coordinator. The program has been well received within Hawaii, and participation by contributors has been very good.

Methods improvement tests of sticky board traps for the oriental, melon, and Mediterranean fruit flies were conducted in the Kona area on the island of Hawaii. The ENT Fruit Fly Investigations Laboratory cooperated in this undertaking. The results indicate that a low cost, efficient trap may be developed. The fruit fly laboratory plans to conduct additional tests on the most promising traps and will evaluate the results.

The attempted eradication program of the vagrant grasshopper (Schistocerca vaga) was terminated when an adult female S. vaga was found one-half mile from the Sand Island infestation on the Sand Island Access Road on November 2, 1965. Additional surveys disclosed a light general infestation in that area. Six applications of LV Malathion had been applied to the 640-acre island in the eradication attempt. The infestation has spread widely in area, but with low populations along the leeward (dry west side) of Oahu, and now extends to Makaha, almost 40 miles from the original infestation on Sand Island.

The Hawaii Department of Agriculture has established an insectary colony of S. vaga and will introduce parasites in a biocontrol attempt. The colony was established using information obtained from the ENT Grasshopper Research Station at Bozeman, Montana. PPC assisted with methods improvement work in this endeavor; however, as they are now starting basic research, we have withdrawn from the project. We will now devote time to survey to keep informed on the spread of this potential pest.

Japanese Beetle

Trapping activities only were carried on during the year. No Japanese beetles were caught. Major emphasis was in and around the formerly infested areas in Sacramento and West Sacramento. Another area of heavier trapping activity was in the vicinity of Modesto in Stanislaus County.

Detection level trapping was conducted in California counties in the areas mentioned above and in Colorado, Hawaii, Nevada, New Mexico, Oregon, Washington, and Wyoming.

JAPANESE BEETLE

Fiscal Year 1966

State	Survey and Detection		Control		Regulatory					
	Sites Trapped	Acres Infested	Chemical Acres	No. Parasites Released	Acres Insp.		Properties Insp.		Acres Treated	
					Nurs.	Other	Indust.	Other	Soil	Foliage
California	32,567									
Colorado	119									
Hawaii	10									
Nevada	28									
New Mexico	11									
Oregon	143									
Washington	60									
Wyoming	24									
Total	32,962									

Khapra Beetle

Cooperative inspections were made in six Western States during the fiscal year. Emphasis was placed in the three states where the pest had been established--Arizona, California, and New Mexico. At the present time Arizona and California are considered to be in the infested category. Arizona's last infested property was found December 15, 1964, and fumigated May 15, 1965. California's last infestation was found March 31, 1966, and fumigated June 16, 1966. Treatment on these two infested properties involved a volume of 3,243,854 cubic feet. There is no record of khapra beetle having been found in New Mexico since May 26, 1959. It is therefore presumed that the pest has been eradicated from that state. In the three states in the Western Region in which khapra beetle had been established, the former inspection schedules were reduced in fiscal year 1966.

Inspections in Arizona followed much the same pattern as formerly. Properties were inspected in the order of importance as to type of establishment: major distributors and users, fumigated properties, request inspections by industry, and suspect properties that had not received scheduled inspections.

Inspections were made throughout California where deemed necessary. A special survey of previously infested properties and principal handlers of host material was conducted in Imperial County. This resulted in the finding of one infestation--The Orita Land and Cattle Company, Brawley, California. A great deal of inspection work was involved in investigating leads to determine the source of infestation. All were negative. At this time the source of that infestation is still unknown. All properties to which material from this firm had been moved were thoroughly investigated. All were negative for khapra beetle.

In New Mexico this fiscal year, the third survey of farm and ranch properties was completed in all counties considered to be in the danger area. These counties received grain and other host commodities from states that are or had been infested with khapra beetle and from establishments in New Mexico that had been infested. Numerous specimens were submitted for determination, and they were negative for khapra beetle.

Inspections were made in Idaho, Oregon, and Washington--to which states commodity shipments from infested ships were made. These commodities were traced, located, and fumigated. No established infestations resulted.

KHAPRA BEETLE

Fiscal Year 1966

State	Survey and Detection		Control	Regulatory		
	Properties					
	Surveyed	Positive	Fumigated Cubic Feet	Properties Inspected	Commodity Lots' Treated	Transports Treated
Arizona	2,946	0	0	17	1	0
California	3,442	1	2,662,000	0	0	0
New Mexico	183	0	0	0	0	0
Washington	379	0	0	0	0	0
Total	6,950	1	2,662,000	17	1	0

Mexican Fruit Fly

The detection survey for this pest was continued in Arizona and California. In Arizona traps were operated in Maricopa, Pima, Santa Cruz, and Yuma Counties, and fruit was inspected for larvae. No flies were trapped, and no larvae were found in fruit examined. In Pima and Santa Cruz Counties the traps were operated from July 1 to August 19, 1965, and from May through June 1966. Fifty-one traps were in use.

Trapping activities in Maricopa and Yuma Counties extended over the period November 1, 1965, to April 29, 1966. In the two counties 105 McPhail traps were distributed in citrus-growing areas and other areas in which host fruits might be found. This included Mexican-American residential sites, farm labor camps, and international airports.

In California each cooperating agency operates a trapline in an assigned area. The agencies are PPC, California Department of Agriculture, and San Diego County Department of Agriculture. During the year less emphasis was placed on primary feeding host plants and more emphasis on uniform trap dispersement, taking advantage of shade or resting hosts as well. This resulted in more nearly complete coverage of the area, with fewer traps per property.

The sterile fly release program on the Mexican side of the Border has satisfactorily replaced the previous spraying program. Numerous color-coded sterile *A. ludens* were trapped along the Border. Only three collections in California were more than 2 miles north of the International Border. The farthest was approximately 12 miles north of the point of release. Marked flies were trapped in the same general locations as during the previous year. On October 7, 1965, the only wild fly of the year was trapped in California. It was caught about 1 mile west and a little north of the main gate at Tijuana. On notification of the catch, the Mexico Region made a sterile fly release south of the Border near the location.

All larval inspections were negative.

MEXICAN FRUIT FLY

Fiscal Year 1966

State	Survey and Detection			Control		Regulatory		
	Traps Installed	Infested		Chemical	Biological	Citrus Acres Trapped	Properties Inspected	
		Properties	Acres	Acres Treated	Flies Released (Units 1,000)		Processing Plants	Other
Arizona	156							
California	3,869							
Total	4,025							

Mormon Cricket

Mormon crickets required control only in Idaho during 1966. Individual ranchers, in cooperation with the Idaho Department of Agriculture and PPC, baited crickets on an estimated 6,800 acres. Ten pounds of bait per acre were used, and the ranchers paid one-third of its cost in addition to spreading it. PPC bait spreaders were lent to the State, and these were used by the ranchers. The baited areas were east of Midvale and Cambridge, Idaho. West of Midvale, PPC sprayed 3,500 acres of BLM land with 8 fluid ounces of Malathion per acre. Bait and spray each effectively controlled the crickets.

Only very light infestations of these insects were observed in other states of the West. Crickets were actually seen and recorded in Arizona, Nevada, Oregon, and Utah, in addition to Idaho. No survey was made this year in California, Colorado, ~~nor~~ and New Mexico.

The Division and its cooperators periodically survey the areas known to have consistently harbored Mormon crickets. This policy has permitted us to detect buildups in time to initiate early control activity and prevent development of widespread infestations.

MORMON CRICKET

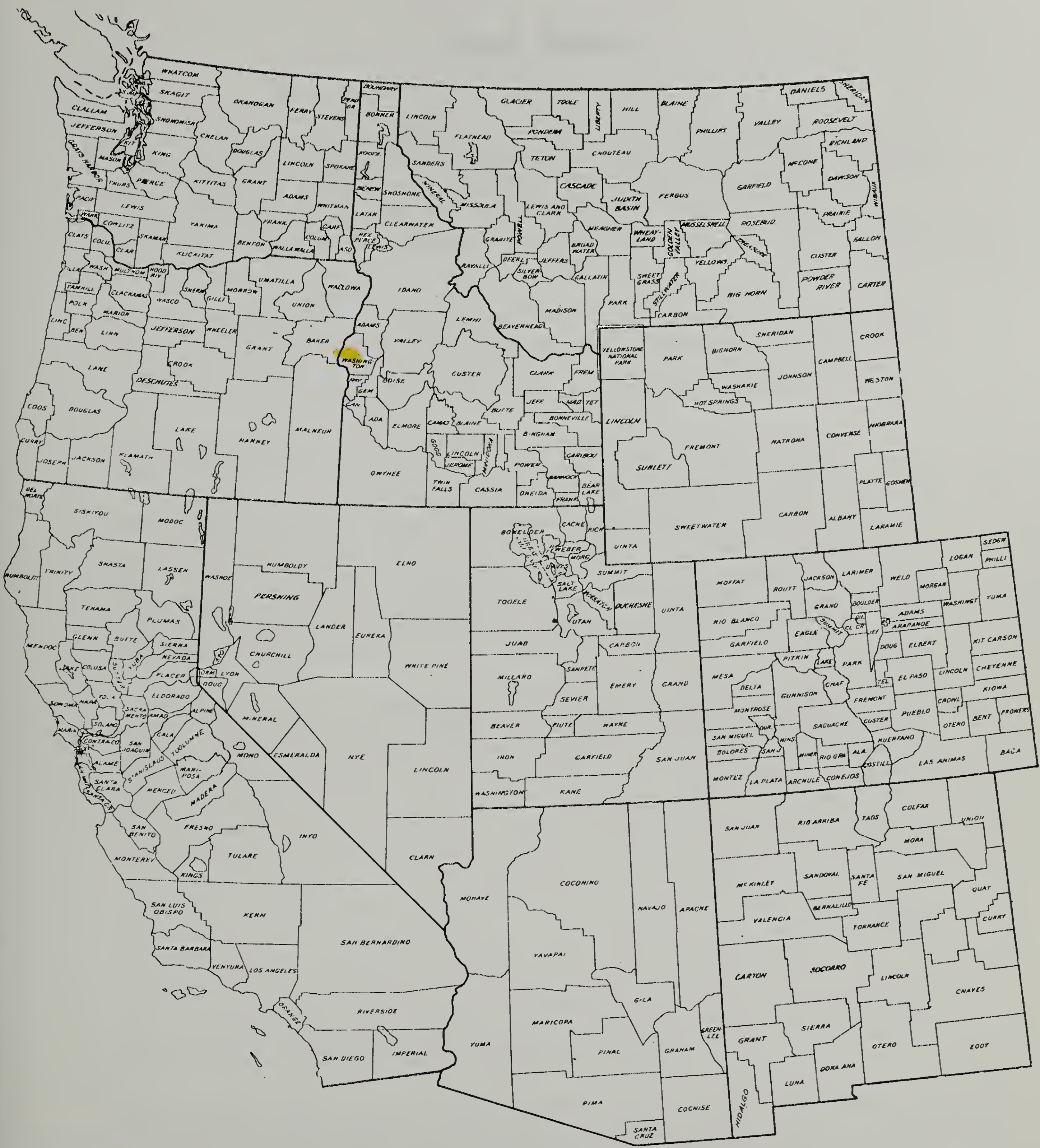
Fiscal Year 1966

State	Survey and Detection	Control
	Acres Infested*	Acres Treated**
Arizona	8,500	0
Idaho	0	10,300
Wyoming	10,600	0
Total	19,100	10,300

*1965 fall survey
**1966 control season

MORMON CRICKET CONTROL

1966 CONTROL SEASON



Areas cooperatively treated, 1966 control season.

UNITED STATES DEPARTMENT OF AGRICULTURE
AGRICULTURAL RESEARCH SERVICE
PLANT PEST CONTROL DIVISION
WESTERN REGION
OCTOBER 1966

Peach Mosaic

Peach mosaic, a virus disease of peach and certain other stone fruits, is a cooperative program in California, Colorado, and Utah. This disease also occurs in the Western Region in Arizona and New Mexico; however, due to the absence of a commercial peach industry, there is no cooperative control of the disease in these two states.

In the cooperative control areas for the past several years, there has been a progressive reduction in the incidence of peach mosaic. This year the incidence of peach mosaic in California, Colorado, and Utah is the lowest in the history of the cooperative program.

Peach growers and the associated industry are fully aware of the importance of the cooperative peach mosaic control program. They also realize that as individuals they are unable to cope with the problems of control, mainly because the regulatory authority to enforce uniform and area-wide procedures is vested in the state or other public agency. With this in mind, and knowing of the destruction and losses suffered by the growers and industry in the thirties because of peach mosaic disease, they vigorously supported continuation of the cooperative work.

A microscopic mite, Eriophyes insidiosus, is known to be the vector of peach mosaic disease. In 1965 a random sampling on a limited basis had located infestations of the vector in flowering peach in Kern, Fresno, and Tulare Counties, California. Peach mosaic disease is not known to occur in the above counties even though the vector is present. In an attempt to discover how general the vector infestation was in a known infested county, and to survey a county with important peach plantings not known to be infested, a grid type survey of flowering peach trees was made in Tulare and Stanislaus Counties. All samples in Stanislaus County were negative. In Tulare County, five new infestations were located. These verified the previous year's work and also included two new areas--Porterville and Woodlake. This was a cooperative effort involving the California Department of Agriculture, County Departments of Agriculture, and PPC personnel.

PPC assisted ENT on the vector control plot in the Lytle Creek area of San Bernardino County, California. None of the replanted trees, some now 4 years old, shows any symptoms of peach mosaic disease.

There were no peach mosaic infected trees found in Utah during the fiscal year 1966. This is the first time that this has occurred in the history of the cooperative work in that state.

Nursery and budwood inspections were made in Colorado, and nursery and nursery dealer inspections were made in California. Nurseries and budwood sources inspected in Colorado were approved. One peach mosaic infected tree was removed from a nursery in San Bernardino County and one in Riverside County. Nurseries in the peach mosaic regulated area of California sell only in the regulated area of that state.

PEACH MOSAIC

Fiscal Year 1966

Nurseries in Regulated Area

State	No. Nurseries Inspected	No. Trees in Nsy. Insp.	No. Nsy. Trees Infected	One-mile Environs Inspection				Date Inf. Trees Removed
				Properties		Trees		
				Insp.	Inf.	Insp.	Inf.	
California	110	7,182	2	0	0	0	0	6/2 & 6/14/66
Colorado	2	1,400	0	4	0	733	0	--
Total	112	8,582	2	4	0	733	0	

Budwood Sources in Regulated Area

State	No. Budwood Sources Inspected	No. Trees in Sources Inspected	One-mile Environs Inspection				Date Infected Trees Removed
			Properties		Trees		
			Inspected	Infected	Inspected	Infected	
Colorado	2	62	4	0	733	0	--
Total	2	62	4	0	733	0	

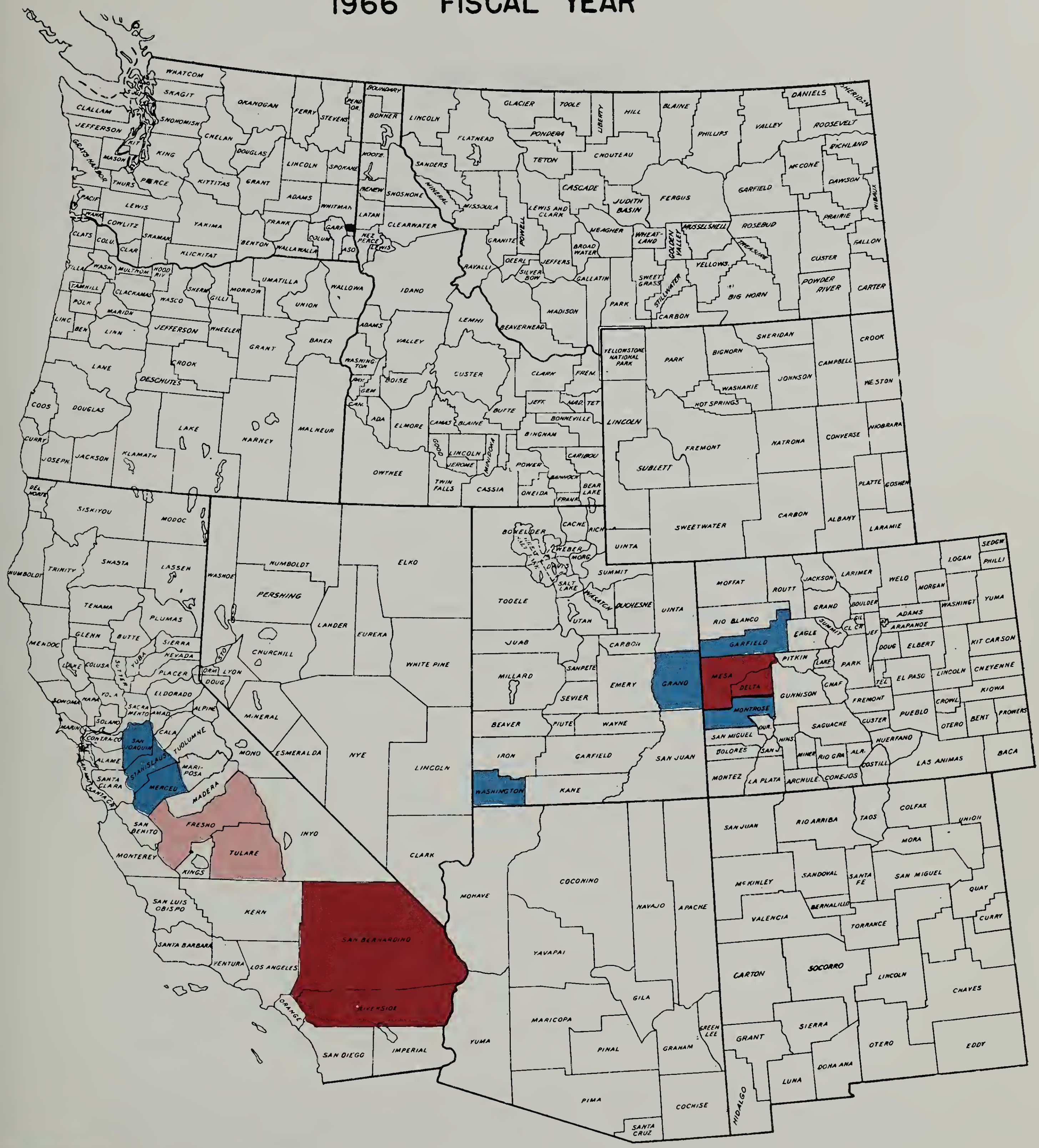
There were no budwood sources in the regulated area of California, and no nurseries or budwood sources in the regulated areas of Utah.

PEACH MOSAIC

Fiscal Year 1966

State	Survey and Detection				Control
	Properties		Hosts		
	Surveyed	Infected	Surveyed	Infected	Trees Removed
California	1,841	19	1,260,105	32	32
Colorado	1,302	38	807,043	50	50
Utah	775	0	28,334	0	0
Total	3,918	57	2,095,482	82	82

PEACH MOSAIC DISEASE CONTROL
1966 FISCAL YEAR



Counties PM infections found and removed FY 1966.

Counties vector found but no infection occurred.

Counties negative survey conducted FY 1966.

JNITED STATES DEPARTMENT OF AGRICULTURE
AGRICULTURAL RESEARCH SERVICE
PLANT PEST CONTROL DIVISION
WESTERN REGION
OCTOBER 1966

Pink Bollworm

During this fiscal year pink bollworm became established in the last two previously uninfested cotton-growing counties of Arizona and in the two southeast counties of California. These infestations occurred in Yuma County, Arizona; in the Palo Verde Valley of Riverside County, California; and in the Bard and Imperial Valleys of Imperial County, California, in the fall of 1965, and in the Topoc area of Mojave County, Arizona, in the spring of 1966. This sudden westward movement of the pest is thought to have resulted from a combination of an explosive buildup of pink bollworm populations in western Maricopa County, Arizona, accompanied by unusually high and persistent winds from the East throughout late September and early October.

Arizona surveys on the 1965-1966 crop were concentrated primarily in Yuma and Mojave Counties. No general survey was made in the central area, but lint cleaner inspections made in conjunction with regulatory visits to gins showed general infestation throughout Pinal and Maricopa Counties, with extremely high populations evident in several communities of Maricopa County. Loss surveys indicated average losses in such communities to be 25 to 27 percent, not counting loss in grade or in cottonseed.

In Yuma and Mohave Counties, 275 sex-lure traps were operated through November 1965. On September 30 the first of 217 moths was trapped in Yuma County. Most moth catches were made in the Gila River Valley, extending from Maricopa County line 75 miles southwest to the Colorado River at Yuma. In the cotton-growing areas in north Yuma County, 19 moths were caught at Salome, Bouse, Parker, and Cibola. Three gin trash machines processed more than 17,000 bushels of trash from Yuma and Mohave Counties from mid-September through mid-January, and 4,200 lint cleaner inspections were made in Mojave County. Thirty-one larvae (21 from gin trash and 10 from field inspections) were recovered in Yuma County on 17 properties, totaling 975 in scattered locations in the Gila and Yuma Valleys.

Late harvest and fall and winter rains greatly hampered cultural practices throughout Arizona in 1965-1966, which could have contributed to greater buildup and spread during the summer of 1966.

Some 250 sex-lure traps were operated in northern Yuma and Mohave Counties in early 1966. The first find in Mohave County occurred during that time when a moth was trapped at Topoc on May 9. No

more finds have occurred in that county as of June 30. Other spring catches occurred at Cibola and Parker in northern Yuma County. Synthetic lure became available in June, but no moths were caught with this material by the end of June.

Because of increased late summer catches in the Gila Valley of Yuma County, Arizona, California surveys were moderately increased. But after an October 4, 1965, catch of a male moth near Blythe in Riverside County and an October 8 catch in the Bard Valley of Imperial County, a greatly enlarged detection effort was undertaken. Two male moths were caught in light traps in the Imperial Valley on October 25. Total moth catches for the 1965 season in California were:

Imperial County - Bard Valley	114
Imperial County - Imperial Valley	2
Imperial County - Palo Verde Valley	1
Riverside County - Palo Verde Valley	23
Total	140

Field inspection and gin trash inspection programs were greatly expanded. Only five larvae were recovered, all in the Bard-Winterhaven area--two from gin trash and three by field inspection.

An emergency regulation was established in late fall by the California Department of Agriculture regulating cultural control practices and movements of host material. These included the establishment of a noncotton period.

In the spring of 1966 further ex~~a~~pansion was made in the detection program. When sufficient lure was available, 750 sex-lure traps were operated. As of June 30, 14 moths had been caught--3 at Bard-Winterhaven, 6 in the Imperial Valley, and 5 in the Palo Verde Valley. They were caught in sex-lure traps using the modified Frick trap. Two of these were caught using synthetic lure. As of June 30, 1966, areas still apparently free of pink bollworm are the San Joaquin Valley, Coachella Valley, Borrego Valley, southern Imperial Valley, Sandy Valley, Needles, Lancaster, and Cantil areas of California, and the Pahrump and Moapa Valleys of Nevada. Survey activities have been stepped up in all of these areas.

California has drawn up plans for chemical treatment of areas found infested in 1966, to start sometime in October. PPC does not plan to participate directly in this treatment program, but will carry a relatively heavy load of the associated phases of the overall pink bollworm program. The California Department of

Agriculture treated all cotton in the Bard-Winterhaven area with one application of Sevin in late fall of 1965 as a precautionary measure against late season buildup of pink bollworm and boll weevil.

An attempt was made to organize Yuma County, Arizona, cotton farmers in the fall and winter of 1965 for an all-out effort against pink bollworm, including a chemical treatment program if infestations appeared in 1966. This attempt failed, so any treatment done there will be by individual effort in the 1966 season.

In New Mexico because of heavy infestations in Eddy and Chaves Counties, the State, at the request of growers, established compulsory cultural control regulations in those two counties. A plowup deadline was set at February 28 and a planting date at April 15 for 1966. By February 28, 98 percent of the cotton in those two counties had been shredded and plowed under. A similar program on a voluntary basis was attempted in Luna County with less success, as only 50 percent of the cotton acreage was plowed by that date.

In central Arizona in cooperation with ENT, some methods improvement trials were under way involving an evaluation of the effectiveness of different types of sex-lure traps and also involving a comparison between natural lure and propylure.

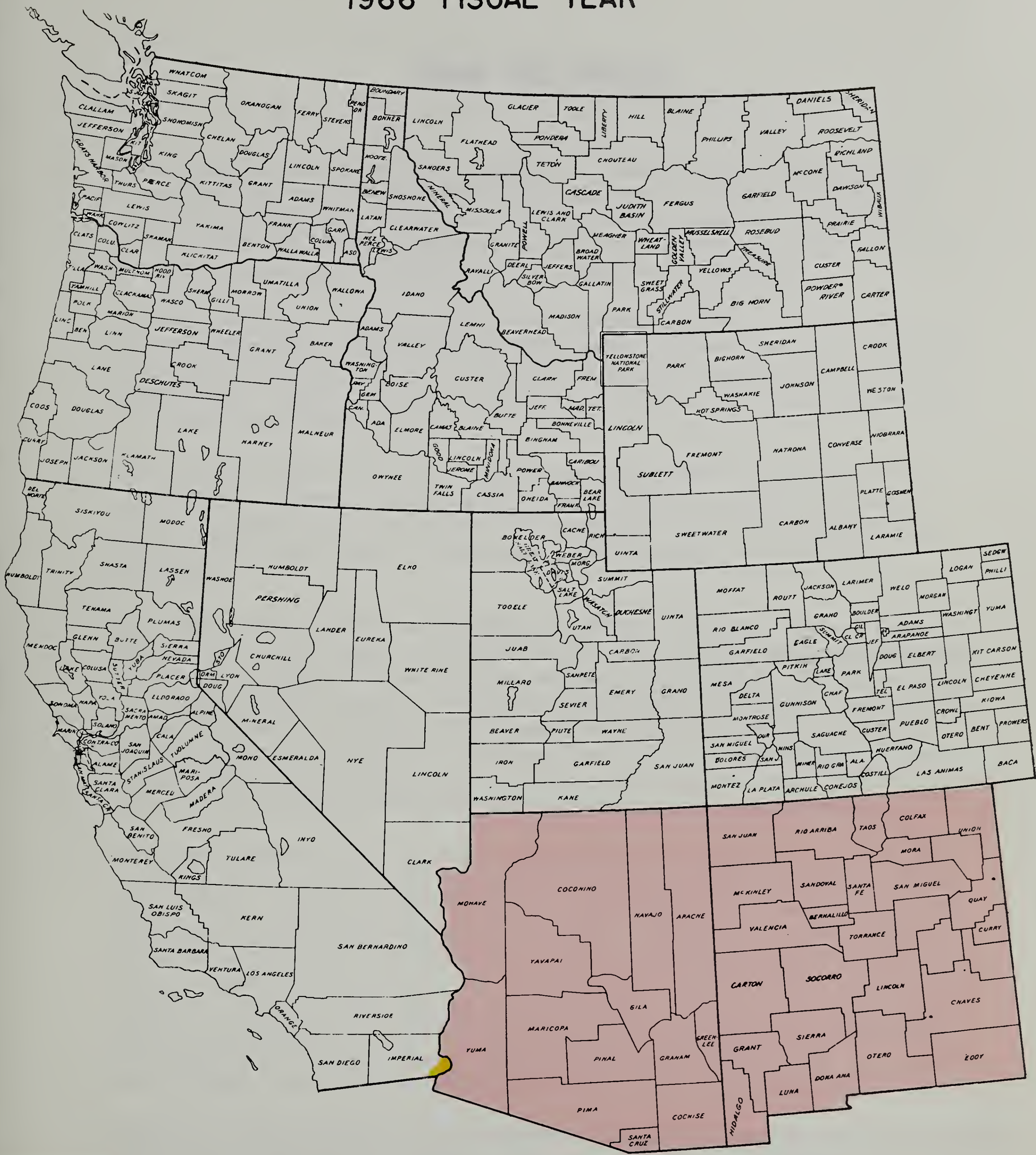
PINK BOLLWORM

Fiscal Year 1966

State	Survey and Detection				Control	Regulatory	
	Surveyed		Infested		Mechanical	Properties Inspected	
	Properties	Acres	Properties	Acres	Acres	Industrial	Other
Arizona	23,143	15,834	17	975	326,616	6,705	0
California	1,852	285,181	4	0	0	0	0
Nevada	15	2,500	0	0	0	0	0
New Mexico	514	10,395	0	0	0	306	0
Total	25,524	313,910	21	975	326,616	7,011	0

PINK BOLLWORM CONTROL

1966 FISCAL YEAR



Areas of general infestation--
cultural control.

Areas eradicative measures applied.

UNITED STATES DEPARTMENT OF AGRICULTURE
AGRICULTURAL RESEARCH SERVICE
PLANT PEST CONTROL DIVISION
WESTERN REGION
OCTOBER 1966

Plant Pest Survey

Plant Pest Control Division elected to increase its financial participation in the Cooperative Survey Program, effective beginning of fiscal year 1967. This was considered important to better balance the increasing costs of salaries, travel, and other essential operating costs associated with this important program.

We are pleased to report that Hawaii joined with us in a Cooperative Survey Agreement in February of this year. Hawaii is in an enviable position so far as number and distribution of entomologists are concerned, and, therefore, was immediately able to put into operation a very fine reporting unit.

The Western Region now has 7 operating agreements--6 regular and 1 modified. Insect reporting by these states, as well as those without agreements, continues to be regular. This past season one workshop was held--that in Montana. It was well received and attended.

The Cooperative Survey and Detection Program depends on full cooperation by all concerned. It is one where the initial enthusiasm generated at the outset can easily, and without appreciable notice, dwindle to a point of stalemate. We cannot allow this to happen. We must be alert to detect new pests and always be fully informed of current economic pest developments. We encourage all our associates to re-evaluate the objectives of the program, continue to give active support, and assist by making constructive suggestions for improvement.

Division personnel are constantly reminded and always alert for the possible occurrence of new pests or unusually high pest population or crop damage. Survey coordinators in the respective states where PPC personnel are assigned are kept currently informed of these observations. In addition, PPC personnel while performing other program activities, and as time allows, make special observations for other program pests. A few included during this year were cereal leaf beetle in Arizona, California, and Colorado; fruit fly complex in conjunction with Mexican fruit fly trapping in Arizona and California; witchweed and European chafer in Arizona; and gypsy moth in California.

Because of the extensive pink bollworm and cotton weevil survey program in Arizona, Nevada, and Mexico, one of the Western Region's entomologists was given special training at the National Museum in Washington in the identification of these pests. He was certified by Insect Identification Branch, ENT, to do field separations and cursory

identification of all suspect specimens submitted to him. These identifications are being done at Blythe, California. In addition to identification of pink bollworm and cotton weevil, the entomologist was certified as being capable of identifying khapra beetle.

Labops, spp., wheat grass bugs, appeared in damaging numbers on crested wheat grass and other grasses in Utah and New Mexico early this summer. Several species were involved, separated to some extent by elevation preference.

In Utah, Labops hesperius (Uhler) devastated much of the reseeded rangeland during 1966. Seed production of crested wheat grass and intermediate wheat grass was reduced considerably, and in many localities was completely eliminated. Although PPC did not become involved in an action program on Labops, inspectors made observations and worked closely with cooperators on the pest occurrence and damage.

Potato Psyllid - Paratrioza cockerelli

Adult potato psyllid overwintering in southern Arizona, California, and New Mexico often develop heavy populations which move to northern states, causing economic losses to important potato and tomato crops. Surveys to evaluate these overwintering populations are made during early spring. Results of the survey are reported to interested state cooperators and simultaneously printed in the CEIR. This year during April, potato psyllid spring breeding areas were surveyed and found to support light to moderate populations.

Hall Scale - Nilotaspis halli (Green)

The finding of a lightly infested seedling almond in Stilson Canyon, Butte County, California, during February 1965, indicated a need for additional survey efforts. Fiscal year 1966 was the first segment of a 4-year planned detection survey for Hall scale. State, county, and PPC inspectors inspected 5,143 hosts on 606 properties in Butte and Yolo Counties. These inspections represented one-fourth of the hosts located in the 1-mile environs of the past treatment areas in these counties. The planned continuation of this inspection program on a grid pattern should, at the end of another 3 years, provide at least one inspection on each host plant within 1-mile environs. The rapid reduction in host plant numbers by orchard removal at Davis, California, will probably permit other detection survey efforts at other points with tenuous association with past infested properties.

Beet Leafhopper (Circulifer tenellus)

PPC personnel made a series of three surveys of the beet leafhopper spring breeding areas in western Arizona, southwestern California, southeastern Nevada, and southwestern Utah. Beginning in February, the surveys were made at approximately 30-day intervals. During past years only two surveys were made, but this season, due to late fall and spring rains, there was more preferred host occurrence, and consequently a heavier population buildup potential.

Reports of surveys were prepared at the conclusion of each trip and circulated to interested cooperators in the states concerned. The reports were also carried in the CEIR.

A survey for beet leafhopper in south central New Mexico was made by PPC personnel from the Southern Region. Information obtained was included in a report covering the Texas spring-breeding area.

During the early spring intensive surveys for beet leafhoppers were made in several counties in southwestern Idaho. For the past 10 years these range areas have been the source from which economic populations of leafhoppers have moved into nearby valuable field seed crops.

Our apprehension that the large acreages of rather lush growth of Russian thistle in the desert areas in 1965 would provide excellent summer and fall host for beet leafhoppers was not without basis, because unusually large numbers of adult Circulifer tenellus went into the winter. Overwintering adult surveys followed by nymphal surveys this spring indicated a need for control on approximately 39,000 acres of rangeland in Ada, Elmore, Owyhee, and Twin Falls Counties. Low-volume Malathion was applied by aircraft to 38,854 acres, and by ground equipment to 856 acres. Results were good.

A beet leafhopper survey was made again this year in Washakie County, Wyoming, in cooperation with Experiment and Extension personnel. Although beet leafhopper populations were present in numbers sufficient to cause damage, growers were unable to illicit interest in a control program, due to lack of funds.

European Pine Shoot Moth - Rhyacionia buoliana (Schiff)

The Division again cooperated with the Oregon Department of Agriculture on the survey of pine stocks at nurseries in the state, particularly in the Portland-Salem territory. Two PPC employees were assigned for a 2-week period during early April. In all cases the PPC personnel only assisted state inspection units engaged in

the survey and did not work independently. Following the 2-week period of PPC assistance, the state inspectors continued the statewide nursery surveys. During only the 2-week PPC work period, the survey was conducted at 32 different nurseries, involving the inspection of 1,117,000 pine trees and representing approximately 115 solid acres of pines in all stages of growth. During the entire nursery survey program throughout Oregon, no European pine shoot moth infestations were located.

In the early summer a minor infestation of European pine shoot moth was found at Davis, California, and traced back to a California nursery. In turn, the pine stock at this nursery was traced to a nursery near Portland, Oregon. This nursery, in 1963, apparently had received a shipment from an infested nursery in the state of Washington that had slipped through quarantine. On intensive reinspection, only a few pines at this nursery were found to be infested. However, all of the pine stock on the nursery was destroyed. Also, an attempt was made to trace and inspect all other pine shipments from the nursery. With this suppression, and with the continued negative findings by the Oregon Department of Forestry and the U. S. Forest Service on foot-scouting surveys throughout the state, Oregon remains categorized as free of European pine shoot moth.

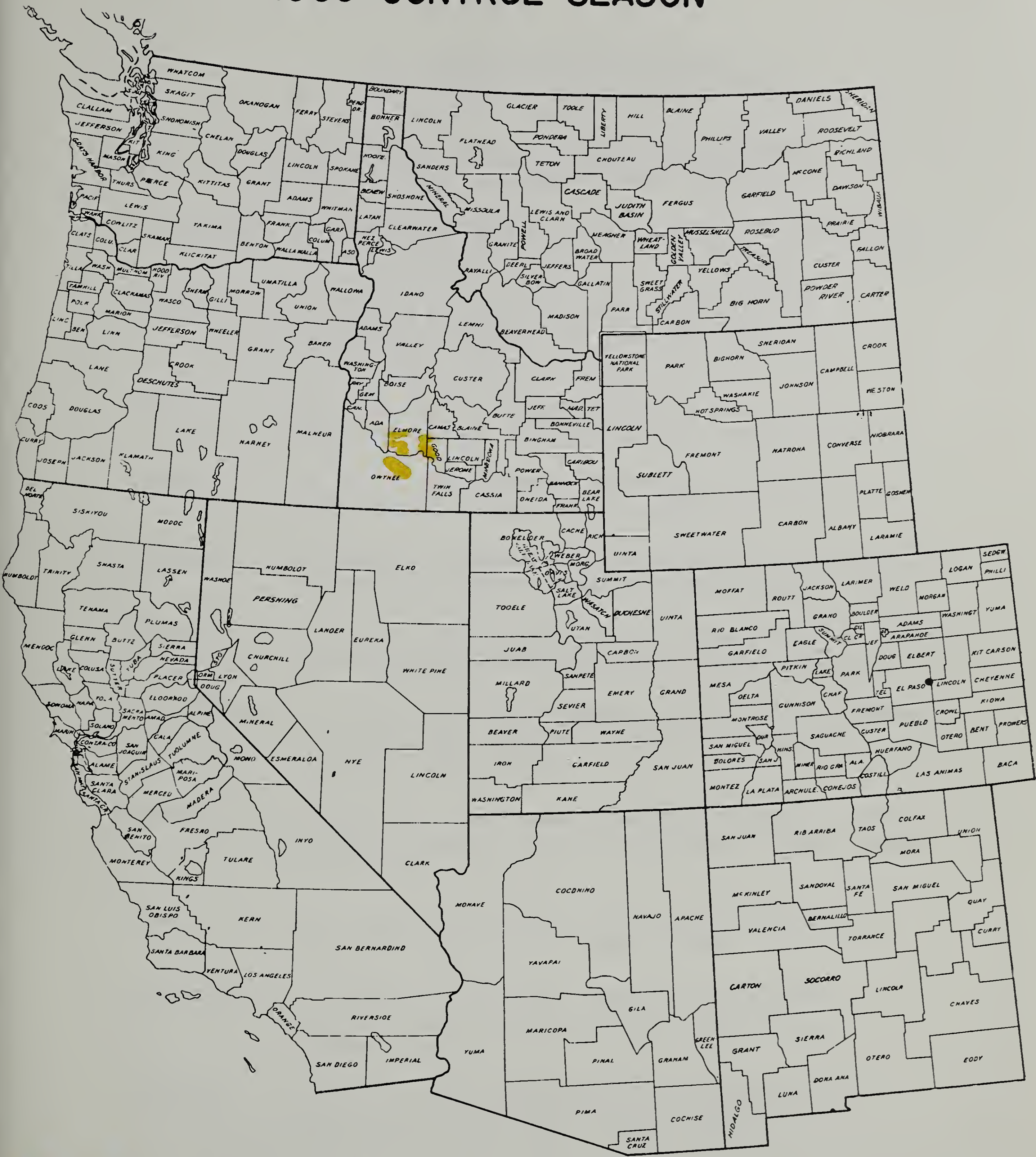
The infested pines located at Davis were promptly fumigated by personnel of the County and State Departments of Agriculture.

The general surveys in eastern Washington for European pine shoot moth by the U. S. Forest Service and the Washington Department of Natural Resources are continuing. There have been no reports of any finding of the pest in eastern Washington. This includes the area of the Spokane Valley, Spokane County, where the insect first was found in the eastern part of Washington and subsequently eradicated. In the infested areas on the West Coast, delimiting surveys are being conducted by the two previously named agencies. The State Department handles the enforcement of the state quarantine.

In cooperation with Utah Department of Agriculture inspectors, PPC personnel assist in inspection of pine stock at nurseries in the Salt Lake City area. These nurseries had received pine shoot moth infested stock from Oregon several years ago. Results were negative.

BEET LEAFHOPPER CONTROL

1966 CONTROL SEASON



Areas cooperatively treated 1966 control season.

UNITED STATES DEPARTMENT OF AGRICULTURE
AGRICULTURAL RESEARCH SERVICE
PLANT PEST CONTROL DIVISION
WESTERN REGION
OCTOBER 1966

State Survey Coordinators
For Economic Insect Survey Reports

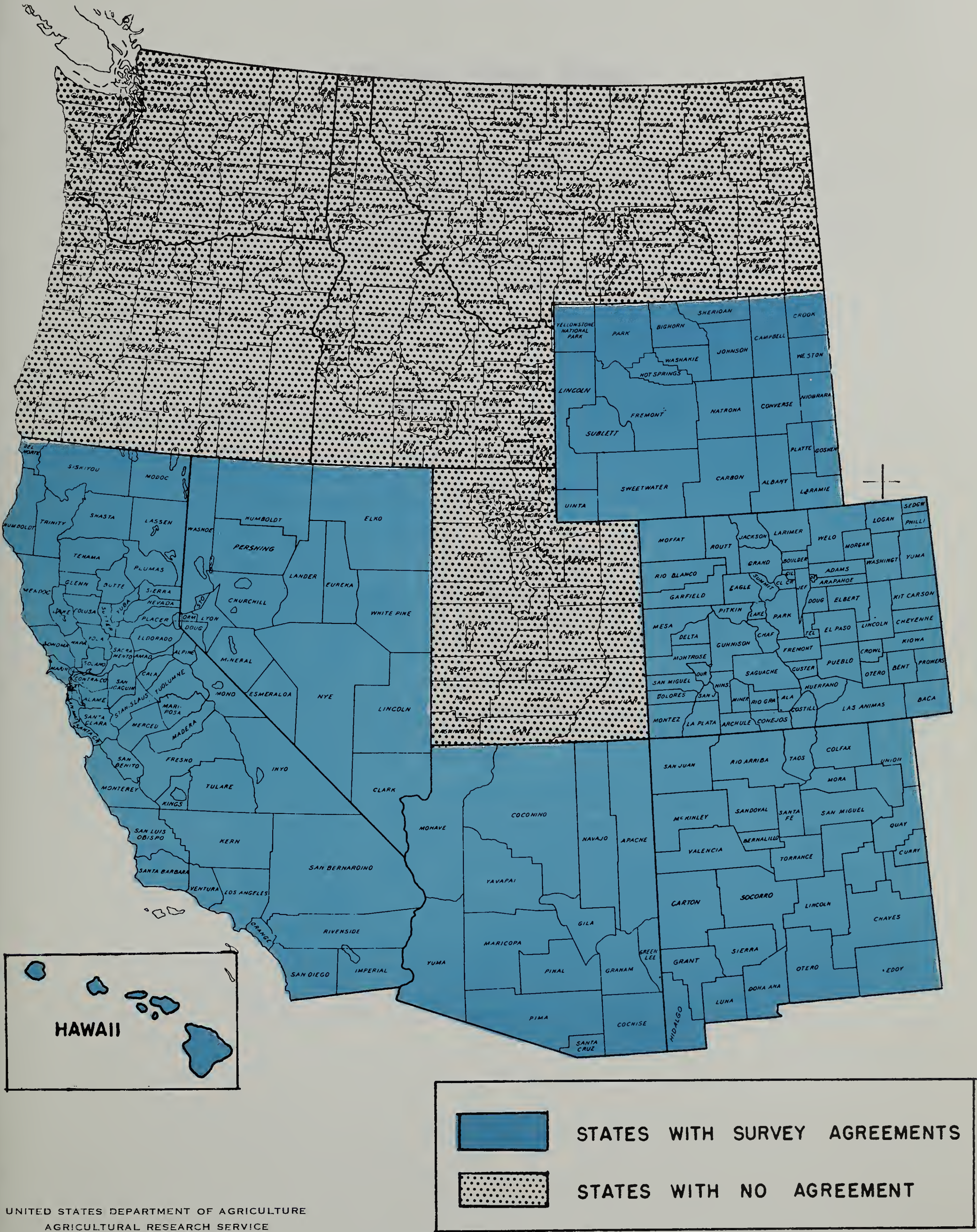
Arizona	Dr. James N. Roney, Extension Entomologist University of Arizona, Phoenix 85001
California	Mr. Robert W. Harper, Chief, Bureau of Entomology State Department of Agriculture, Sacramento 95814
Colorado	Dr. Leslie B. Daniels, Head, Department of Entomology, Colorado State University Ft. Collins 80521
Hawaii	Mr. C. J. Davis, State Entomologist State Department of Agriculture, Honolulu 96814
Idaho	Dr. H. C. Manis, Head, Department of Entomology University of Idaho, Moscow 83843
Montana	Dr. James H. Pepper, Head, Department of Zoology and Entomology, Montana State College, Bozeman 59715
Nevada	Mr. Lee M. Burge, Director, Division of Plant Industry State Department of Agriculture, Reno 89504
New Mexico	Mr. Dallas Rierson, Director, New Mexico Department of Agriculture, New Mexico State University University Park 88070
Oregon	Mr. William H. Kosesan, Assistant Chief, Division of Plant Industry, State Department of Agriculture Salem 97310
Utah	Dr. George F. Knowlton, Extension Entomologist Utah State University, Logan 84321
Washington	Dr. Horace S. Telford, Chairman, Department of Entomology, Washington State University Pullman 99164
Wyoming	Dr. W. D. Fronk, Department of Entomology University of Wyoming, Laramie 82071

Survey Entomologists

Arizona	Mr. Dale G. Fullerton Arizona Commission of Agriculture and Horticulture	Phoenix
California	Mr. Ronald Hawthorne State Department of Agriculture	Sacramento
Colorado	Mr. Leonard E. Jenkins Colorado State University	Ft. Collins
Hawaii	Mr. George Y. Funasaki State Department of Agriculture	Honolulu
Nevada	Mr. Robert C. Bechtel State Department of Agriculture	Reno
Wyoming	Mr. William D. Marks University of Wyoming	Laramie

COOPERATIVE ECONOMIC INSECT SURVEY

FISCAL YEAR 1966



UNITED STATES DEPARTMENT OF AGRICULTURE
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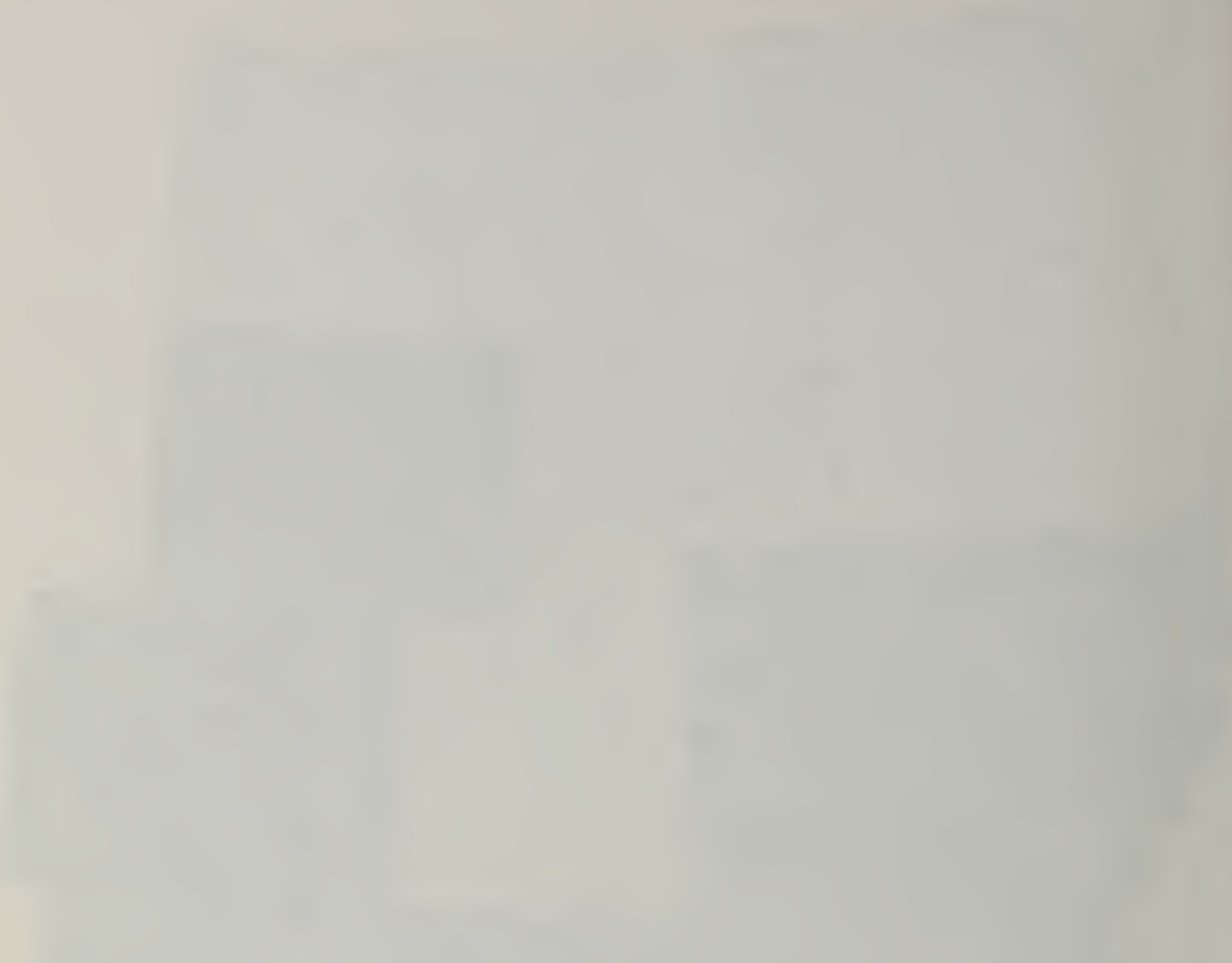

Western Cotton Weevil

During this fiscal year there was further movement westward of the "western cotton weevil." It was found for the first time in California when on December 21, 1965, four fully developed larvae were recovered from two cotton bolls in a 30-acre field just west of Winterhaven. Because of a number of finds of this pest in Yuma County, Arizona, the summer of 1965 and the previous fall the cooperative detection effort in California involving Federal, State, and county forces was stepped up extensively in the 1965 season.

Visual field surveys, supplemented by D-Vac vacuum nets and the simultaneous examination of gin trash in connection with pink bollworm survey, were used in the search for the cotton weevil. In addition to the Bard Valley, all other cotton-growing areas of the state were surveyed, but with negative results.

In Arizona PPC assisted ENT and the University of Arizona in weekly cotton weevil surveys. During the period July 1 to November 30, data were gathered through inspections of squares, blooms, and bolls in five selected cotton fields each in Maricopa, Pima, Pinal, Yuma, and Santa Cruz Counties.

Most Arizona fields surveyed by PPC in the fall of 1965 showed sharp cotton weevil population increases. This was especially true in the Rainbow Valley area and also in other locations in Maricopa, Pinal, and Pima Counties.

ENT workers recovered four adult cotton weevils during January 1966 from noncotton trash obtained from three sides of a planted cotton field south of Stanfield in Pinal County, Arizona. Four adult weevils were similarly recovered from cotton debris from a field at Agua Caliente in western Maricopa County the same winter.

In New Mexico weevil surveys were done in conjunction with pink bollworm surveys from July through November 1965 in all cotton-growing counties adjacent to Texas and Mexico. Results were negative.

WESTERN COTTON WEEVIL

Fiscal Year 1966

State	Survey and Detection				Control	
	Surveyed		Infested		Acres Treated	
	Properties	Acres	Properties	Acres	Initial	Aggregate
Arizona	3,932	36,852	0	0	0	0
California	2,223	141,425	1	30	0	0
New Mexico	329	6,602	0	0	0	0
Total	6,484	184,879	1	30	0	0

GPO 973-720

PERCY PEST

ATTENTION:

PERCY WANTS TO KNOW IF YOU ARE DOING ALL YOU SHOULD DO TO DETECT AND REPORT INSECT PESTS.